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(54) Title: 97 HUMAN SECRETED PROTEINS			
(57) Abstract			
<p>The present invention relates to novel human secreted proteins and isolated nucleic acids containing the coding regions of the genes encoding such proteins. Also provided are vectors, host cells, antibodies, and recombinant methods for producing human secreted proteins. The invention further relates to diagnostic and therapeutic methods useful for diagnosing and treating disorders related to these novel human secreted proteins.</p>			

excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1365 of SEQ ID NO:38, b is an integer of 15 to 1379, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:38, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 29

The translation product of this gene shares sequence homology with coxsackie and adenovirus receptor in mouse. Particularly, this gene shares sequence homology with a human A33 antigen, which is a transmembrane protein and a novel member of the immunoglobulin superfamily. (See Proc. Natl. Acad. Sci. U.S.A. 94, 469-474 (1997); see also, Accession No. 1814277; all references available through the accession and reference are hereby incorporated herein by reference.) Therefore, this gene likely has activity similar to the human A33 antigen.

Preferred polypeptides of the invention comprise the following amino acid sequence:

MISLPGPLVTNLLRFLFLGLSALAPPSRAQLQLHLPANRLQAVEGGEVVLPAW
YTLHGEVSSSQPWEVPFVMWFFKQKEKEDQVLSYINGVTTSKPGVSLVYSMP
SRNLSLRLEGLQEKGDSGPYSCSVNVQNKQGKSRGHSIKTLELNVLPAPPSC
RLQGVPHVGANVTLSQSPRSKPAVQYQWDRQLPSFQTFAPALDVIRGSL
LTNLSSSMAGVYVCKAHNEVGTAQCNVTLEVSTGPGAAVAVGTLVG
LGLLAGLVLLYHRRGKALEEPANDIKEDAIAPRTLWPWKSSDTISKNGTLSSV
TSARALRPPHGP RP GAL TPTPSLSSQALPSPRLPTDGAHPQPISPIPGGVSSSG
LSRMGAVPVMVPAQSQAGSL (SEQ ID NO: 291),
MISLPGPLVTNLLRFLFLGLSALAPPSRAQLQLHL (SEQ ID NO: 292),
PANRLQAVEGGEVVLPAWYTLHGEVSSSQPWEVPF (SEQ ID NO: 293),
VMWFFKQKEKEDQVLSYINGVTTSKPGVSLVYSMP (SEQ ID NO: 294),
SRNLSLRLEGLQEKGDSGPYSCSVNVQNKQGKSRGH (SEQ ID NO: 295),
SIKTLELNVLPAPPSCRLQGVPHVGANVTLSQ (SEQ ID NO: 296),
SPRSKPAVQYQWDRQLPSFQTFAPALDVIRGSL (SEQ ID NO: 297),
LTNLSSSMAGVYVCKAHNEVGTAQCNVTLEVSTGP (SEQ ID NO: 298),

GAAVVAGAVVGTLVGLGLLAGLVLLYHRRGKALEE (SEQ ID NO: 299),
 PANDIKEDAIAPRTLTPWPKSSDTISKNGTLSSVTS (SEQ ID NO: 300),
 ARALRPPHGPPRPGALTPTPSLSSQALPSPRLPTT (SEQ ID NO: 301), and/or
 DGAHPQPISPIPGGVSSSGLSRMGAVPVMVPAQSQAGSL (SEQ ID NO: 302).

- 5 Polynucleotides encoding these polypeptides are also provided.

This gene is expressed in various tissues including placenta, brain, heart, muscle, adipocytes, and liver.

- Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions: viral diseases, and immune diseases and/or disorders. Similarly, polypeptides and antibodies directed to those polypeptides are useful to provide immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system and central nervous system,
- 15 expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., CNS, reproductive, vascular, cancerous and wounded tissues) or bodily fluids (e.g., lymph, amniotic fluid, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e.,
- 20 the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

- The tissue distribution in various tissues including placenta, brain, heart, muscle, adipocytes, and liver, and the homology to A33 antigen indicates that the protein product of this gene is useful for the diagnosis and/or treatment of a variety of
- 25 cancers, most notably cancers of the immune system, as well as viral infections. Expression of this gene product suggests that this gene may be a player in the progression of these diseases, and may be a beneficial target for inhibitors as therapeutics. Representative uses are described in the "Chemotaxis" and "Binding Activity" sections below, in Examples 11, 12, 13, 14, 15, 16, 18, 19, and 20, and
- 30 elsewhere herein. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional

supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:39 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1918 of SEQ ID NO:39, b is an integer of 15 to 1932, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:39, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 30

Preferred polypeptides of the invention comprise the following amino acid sequence: GSSFVVSEGSYLDISDWLNPAKLSLYY (SEQ ID NO: 303), LDISDWLNPAKL (SEQ ID NO: 304), SDWLNPAKLSL (SEQ ID NO: 305), and/or DACEQLCDPETGE (SEQ ID NO: 310). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in human ovary and adrenal gland tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, reproductive diseases and/or disorders, particularly ovarian cancer.

Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the reproductive system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., reproductive, and cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e.,

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149

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(54) Title: 97 HUMAN SECRETED PROTEINS			
(57) Abstract			
<p>The present invention relates to novel human secreted proteins and isolated nucleic acids containing the coding regions of the genes encoding such proteins. Also provided are vectors, host cells, antibodies, and recombinant methods for producing human secreted proteins. The invention further relates to diagnostic and therapeutic methods useful for diagnosing and treating disorders related to these novel human secreted proteins.</p>			

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97 Human Secreted Proteins

Field of the Invention

This invention relates to newly identified polynucleotides and the polypeptides encoded by these polynucleotides, uses of such polynucleotides and polypeptides, and their production.

Background of the Invention

Unlike bacterium, which exist as a single compartment surrounded by a membrane, human cells and other eucaryotes are subdivided by membranes into many functionally distinct compartments. Each membrane-bounded compartment, or organelle, contains different proteins essential for the function of the organelle. The cell uses "sorting signals," which are amino acid motifs located within the protein, to target proteins to particular cellular organelles.

One type of sorting signal, called a signal sequence, a signal peptide, or a leader sequence, directs a class of proteins to an organelle called the endoplasmic reticulum (ER). The ER separates the membrane-bounded proteins from all other types of proteins. Once localized to the ER, both groups of proteins can be further directed to another organelle called the Golgi apparatus. Here, the Golgi distributes the proteins to vesicles, including secretory vesicles, the cell membrane, lysosomes, and the other organelles.

Proteins targeted to the ER by a signal sequence can be released into the extracellular space as a secreted protein. For example, vesicles containing secreted proteins can fuse with the cell membrane and release their contents into the extracellular space - a process called exocytosis. Exocytosis can occur constitutively or after receipt of a triggering signal. In the latter case, the proteins are stored in secretory vesicles (or secretory granules) until exocytosis is triggered. Similarly, proteins residing on the cell membrane can also be secreted into the extracellular space by proteolytic cleavage of a "linker" holding the protein to the membrane.

Despite the great progress made in recent years, only a small number of genes encoding human secreted proteins have been identified. These secreted proteins include the commercially valuable human insulin, interferon, Factor VIII, human

the pervasive role of secreted proteins in human physiology, a need exists for identifying and characterizing novel human secreted proteins and the genes that encode them. This knowledge will allow one to detect, to treat, and to prevent medical disorders by using secreted proteins or the genes that encode them.

5

Summary of the Invention

The present invention relates to novel polynucleotides and the encoded polypeptides. Moreover, the present invention relates to vectors, host cells, antibodies, and recombinant methods for producing the polypeptides and polynucleotides. Also provided are diagnostic methods for detecting disorders related to the polypeptides, and therapeutic methods for treating such disorders. The invention further relates to screening methods for identifying binding partners of the polypeptides.

15

Detailed Description

Definitions

The following definitions are provided to facilitate understanding of certain terms used throughout this specification.

In the present invention, "isolated" refers to material removed from its original environment (e.g., the natural environment if it is naturally occurring), and thus is altered "by the hand of man" from its natural state. For example, an isolated polynucleotide could be part of a vector or a composition of matter, or could be contained within a cell, and still be "isolated" because that vector, composition of matter, or particular cell is not the original environment of the polynucleotide.

In the present invention, a "secreted" protein refers to those proteins capable of being directed to the ER, secretory vesicles, or the extracellular space as a result of a signal sequence, as well as those proteins released into the extracellular space without necessarily containing a signal sequence. If the secreted protein is released into the extracellular space, the secreted protein can undergo extracellular processing to produce a "mature" protein. Release into the extracellular space can occur by many mechanisms, including exocytosis and proteolytic cleavage.

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In specific embodiments, the polynucleotides of the invention are less than 300 kb, 200 kb, 100 kb, 50 kb, 15 kb, 10 kb, or 7.5 kb in length. In a further embodiment, polynucleotides of the invention comprise at least 15 contiguous nucleotides of the coding sequence, but do not comprise all or a portion of any intron.

5 In another embodiment, the nucleic acid comprising the coding sequence does not contain coding sequences of a genomic flanking gene (i.e., 5' or 3' to the gene in the genome).

As used herein, a "polynucleotide" refers to a molecule having a nucleic acid sequence contained in SEQ ID NO:X or the cDNA contained within the clone deposited with the ATCC. For example, the polynucleotide can contain the

10 nucleotide sequence of the full length cDNA sequence, including the 5' and 3' untranslated sequences, the coding region, with or without the signal sequence, the secreted protein coding region, as well as fragments, epitopes, domains, and variants of the nucleic acid sequence. Moreover, as used herein, a "polypeptide" refers to a

15 molecule having the translated amino acid sequence generated from the polynucleotide as broadly defined.

In the present invention, the full length sequence identified as SEQ ID NO:X was often generated by overlapping sequences contained in multiple clones (contig analysis). A representative clone containing all or most of the sequence for SEQ ID

20 NO:X was deposited with the American Type Culture Collection ("ATCC"). As shown in Table 1, each clone is identified by a cDNA Clone ID (Identifier) and the ATCC Deposit Number. The ATCC is located at 10801 University Boulevard, Manassas, Virginia 20110-2209, USA. The ATCC deposit was made pursuant to the terms of the Budapest Treaty on the international recognition of the deposit of

25 microorganisms for purposes of patent procedure.

A "polynucleotide" of the present invention also includes those polynucleotides capable of hybridizing, under stringent hybridization conditions, to sequences contained in SEQ ID NO:X, the complement thereof, or the cDNA within the clone deposited with the ATCC. "Stringent hybridization conditions" refers to an

30 overnight incubation at 42° C in a solution comprising 50% formamide, 5x SSC (750 mM NaCl, 75 mM sodium citrate), 50 mM sodium phosphate (pH 7.6), 5x Denhardt's

solution, 10% dextran sulfate, and 20 µg/ml denatured, sheared salmon sperm DNA, followed by washing the filters in 0.1x SSC at about 65°C.

Also contemplated are nucleic acid molecules that hybridize to the polynucleotides of the present invention at lower stringency hybridization conditions.

- 5 Changes in the stringency of hybridization and signal detection are primarily accomplished through the manipulation of formamide concentration (lower percentages of formamide result in lowered stringency); salt conditions, or temperature. For example, lower stringency conditions include an overnight incubation at 37°C in a solution comprising 6X SSPE (20X SSPE = 3M NaCl; 0.2M
- 10 NaH_2PO_4 ; 0.02M EDTA, pH 7.4), 0.5% SDS, 30% formamide, 100 µg/ml salmon sperm blocking DNA; followed by washes at 50°C with 1XSSPE, 0.1% SDS. In addition, to achieve even lower stringency, washes performed following stringent hybridization can be done at higher salt concentrations (e.g. 5X SSC).

- Note that variations in the above conditions may be accomplished through the
- 15 inclusion and/or substitution of alternate blocking reagents used to suppress background in hybridization experiments. Typical blocking reagents include Denhardt's reagent, BLOTTO, heparin, denatured salmon sperm DNA, and commercially available proprietary formulations. The inclusion of specific blocking reagents may require modification of the hybridization conditions described above,
- 20 due to problems with compatibility.

- Of course, a polynucleotide which hybridizes only to polyA+ sequences (such as any 3' terminal polyA+ tract of a cDNA shown in the sequence listing), or to a complementary stretch of T (or U) residues, would not be included in the definition of "polynucleotide," since such a polynucleotide would hybridize to any nucleic acid
- 25 molecule containing a poly (A) stretch or the complement thereof (e.g., practically any double-stranded cDNA clone).

- The polynucleotide of the present invention can be composed of any polyribonucleotide or polydeoxribonucleotide, which may be unmodified RNA or DNA or modified RNA or DNA. For example, polynucleotides can be composed of
- 30 single- and double-stranded DNA, DNA that is a mixture of single- and double-stranded regions, single- and double-stranded RNA, and RNA that is mixture of single- and double-stranded regions, hybrid molecules comprising DNA and RNA

that may be single-stranded or, more typically, double-stranded or a mixture of single- and double-stranded regions. In addition, the polynucleotide can be composed of triple-stranded regions comprising RNA or DNA or both RNA and DNA. A polynucleotide may also contain one or more modified bases or DNA or RNA
5 backbones modified for stability or for other reasons. "Modified" bases include, for example, tritylated bases and unusual bases such as inosine. A variety of modifications can be made to DNA and RNA; thus, "polynucleotide" embraces chemically, enzymatically, or metabolically modified forms.

The polypeptide of the present invention can be composed of amino acids
10 joined to each other by peptide bonds or modified peptide bonds, i.e., peptide isosteres, and may contain amino acids other than the 20 gene-encoded amino acids. The polypeptides may be modified by either natural processes, such as posttranslational processing, or by chemical modification techniques which are well known in the art. Such modifications are well described in basic texts and in more
15 detailed monographs, as well as in a voluminous research literature. Modifications can occur anywhere in a polypeptide, including the peptide backbone, the amino acid side-chains and the amino or carboxyl termini. It will be appreciated that the same type of modification may be present in the same or varying degrees at several sites in a given polypeptide. Also, a given polypeptide may contain many types of
20 modifications. Polypeptides may be branched, for example, as a result of ubiquitination, and they may be cyclic, with or without branching. Cyclic, branched, and branched cyclic polypeptides may result from posttranslation natural processes or may be made by synthetic methods. Modifications include acetylation, acylation, ADP-ribosylation, amidation, covalent attachment of flavin, covalent attachment of a
25 heme moiety, covalent attachment of a nucleotide or nucleotide derivative, covalent attachment of a lipid or lipid derivative, covalent attachment of phosphatidylinositol, cross-linking, cyclization, disulfide bond formation, demethylation, formation of covalent cross-links, formation of cysteine, formation of pyroglutamate, formylation, gamma-carboxylation, glycosylation, GPI anchor formation, hydroxylation,
30 iodination, methylation, myristoylation, oxidation, pegylation, proteolytic processing, phosphorylation, prenylation, racemization, selenoylation, sulfation, transfer-RNA mediated addition of amino acids to proteins such as arginylation, and ubiquitination.

(See, for instance, PROTEINS - STRUCTURE AND MOLECULAR PROPERTIES, 2nd Ed., T. E. Creighton, W. H. Freeman and Company, New York (1993); POSTTRANSLATIONAL COVALENT MODIFICATION OF PROTEINS, B. C. Johnson, Ed., Academic Press, New York, pgs. 1-12 (1983); Seifter et al., Meth Enzymol 182:626-646 (1990); Rattan et al., Ann NY Acad Sci 663:48-62 (1992).)

"SEQ ID NO:X" refers to a polynucleotide sequence while "SEQ ID NO:Y" refers to a polypeptide sequence, both sequences identified by an integer specified in Table 1.

"A polypeptide having biological activity" refers to polypeptides exhibiting activity similar, but not necessarily identical to, an activity of a polypeptide of the present invention, including mature forms, as measured in a particular biological assay, with or without dose dependency. In the case where dose dependency does exist, it need not be identical to that of the polypeptide, but rather substantially similar to the dose-dependence in a given activity as compared to the polypeptide of the present invention (i.e., the candidate polypeptide will exhibit greater activity or not more than about 25-fold less and, preferably, not more than about tenfold less activity, and most preferably, not more than about three-fold less activity relative to the polypeptide of the present invention.)

Polynucleotides and Polypeptides of the Invention

FEATURES OF PROTEIN ENCODED BY GENE NO: 1

The translation product of this gene shares sequence homology with tag-7 which is thought to be important in tumor metastasis and is itself a secretory protein (See, Kiselev SL, et al., J Biol Chem. 273:18633 (1998) and Genetika. 1996 May; 32(5): 621-628. (Russian)), and a family of peptidoglycan recognition proteins involved in the innate immune response to peptidoglycan in species as diverse as insects and humans (See, Kang, D. et.al., PNAS 95:10078 (1998)).

Preferred polypeptides of the invention comprise the following amino acid sequence: WAGTQEPTGLPSTLSRSESWDH (SEQ ID NO: 211). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in keratinocytes.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, dermatological disorders, especially skin cancers such as melanoma.

- 5 Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the integumentary system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., skin, cancerous and
- 10 wounded tissues) or bodily fluids (e.g., sweat, lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

- Preferred epitopes include those comprising a sequence shown in SEQ ID NO:
- 15 111 as residues: Ser-25 to Ala-31, Gln-146 to Ser-151, His-231 to Asn-236.

- The tissue distribution in keratinocytes and homology to tag-7 indicates that the protein products of this gene are useful for detection, treatment, and/or prevention of dermatological disorders, especially skin cancers like melanoma, and integumentary tumors (e.g., keratoses, Bowen's disease, basal cell carcinoma,
- 20 squamous cell carcinoma, malignant melanoma, Paget's disease, mycosis fungoides, and Kaposi's sarcoma). Tag-7 was discovered when gene expression was compared in a metastatic (VMR-Liv) neoplastic cell line and a related nonmetastatic (VMR-O) neoplastic cell line by means of the differential display method. A fragment of cDNA corresponding to the tag-7 gene, differentially expressed in the metastatic cell line,
- 25 was isolated. The full-length tag-7 cDNA was cloned and its nucleotide sequence was determined. The gene sequence claimed in this patent application has significant homology to tag-7 and on that basis is expected to share significant biological activities with tag-7. Such activities can be assayed as set forth herein and by assays known in the art.

- 30 Additionally, the homology to a conserved peptidoglycan recognition protein family involved in innate immunity, suggests that polynucleotides and polypeptides corresponding to this gene are useful for the treatment, diagnosis, and/or prevention

of various skin disorders including congenital disorders (e.g., nevi, moles, freckles, Mongolian spots, hemangiomas, port-wine syndrome), injuries and inflammation of the skin (e.g., wounds, rashes, prickly heat disorder, psoriasis, dermatitis), atherosclerosis, urticaria, eczema, photosensitivity, autoimmune disorders (e.g., lupus erythematosus, vitiligo, dermatomyositis, morphea, scleroderma, pemphigoid, and pemphigus), keloids, striae, erythema, petechiae, purpura, and xanthelasma. Moreover, such disorders may predispose increased susceptibility to viral and bacterial infections of the skin (e.g., cold sores, warts, chickenpox, molluscum contagiosum, herpes zoster, boils, cellulitis, erysipelas, impetigo, tinea, athlete's foot, and ringworm). Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and immunotherapy targets for the above listed tumors and tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:11 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1177 of SEQ ID NO:11, b is an integer of 15 to 1191, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:11, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 2

The translation product of this gene shares weak sequence homology with FGF Receptor Ligand-2 which is thought to be important in activating FGF receptor in mediating cell proliferative functions.

Preferred polypeptides of the invention comprise the following amino acid sequence: EIIHNLPTSRMAARTKKKNDIINIKVPADCNTRMSYYYKGS
GKRGEMESWLVMSSWSILDFEFLEARPQLFNLVYTEHSTYSGRHYTRERGGF
MVFKNSYSQLLKRDLSLCAFIQPMALNIIHVPMSKCFPAQSGPSTFRSLW
WCPHPISKCQLGLYSSQIRDIPYLA (SEQ ID NO: 212),

EIIHNLPTSRMAARTKKKNDIINIKVPADCNTRMS (SEQ ID NO: 213),
YYYKGSGKRGEMESWLVMSSWSILDFEFLEARPQLF (SEQ ID NO: 214),
NLVYTEHSTYSGRHYTRERGGFMVFKNSYSQLLLR (SEQ ID NO: 215),
KDSLCAFIQPMALNIIHVPMSKCIFPAQSGPSTF (SEQ ID NO: 216), and/or
5 RSLWWCPHPISKCQLGLYSSQIRDIPYLA (SEQ ID NO: 217). Polynucleotides
encoding these polypeptides are also provided.

This gene is expressed primarily in neutrophils.

Therefore, polynucleotides and polypeptides of the invention are useful as
reagents for differential identification of the tissue(s) or cell type(s) present in a
10 biological sample and for diagnosis of diseases and conditions which include, but are
not limited to, abnormal immune reactions or disorders. Similarly, polypeptides and
antibodies directed to these polypeptides are useful in providing immunological probes
for differential identification of the tissue(s) or cell type(s). For a number of disorders
of the above tissues or cells, particularly of the immune system tissue and connective
15 tissues, expression of this gene at significantly higher or lower levels may be
routinely detected in certain tissues or cell types (e.g., immune, cancerous and
wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid
and spinal fluid) or another tissue or cell sample taken from an individual having such
a disorder, relative to the standard gene expression level, i.e., the expression level in
20 healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO:
112 as residues: Met-1 to Met-6.

The tissue distribution and homology to FGF Receptor Ligand-2 indicates that
the protein products of this gene are useful for detection, treatment, and/or prevention
25 of immune disorders, especially those that are mediated by neutrophil functions. They
can be utilized in the treatment of neural and immune disorders, or to stimulate
proliferation of vertebrate cells, raise antibodies, and to screen for antagonists useful
for inhibiting tumor growth. Moreover, the expression of this gene product suggests a
role in regulating the proliferation, survival, differentiation, and/or activation of
30 hematopoietic cell lineages, including blood stem cells. This gene product may be
involved in the regulation of cytokine production, antigen presentation, or other

processes that may also suggest a usefulness in the treatment of cancer (e.g., by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the natural gene product may be involved in immune functions. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immunodeficiency diseases such as AIDS, leukemia, rheumatoid arthritis, granulomatous disease, inflammatory bowel disease, sepsis, acne, neutropenia, neutrophilia, psoriasis, hypersensitivities, such as T-cell mediated cytotoxicity; immune reactions to transplanted organs and tissues, such as host-versus-graft and graft-versus-host diseases, or autoimmunity disorders, such as autoimmune infertility, lense tissue injury, demyelination, systemic lupus erythematosus, drug induced hemolytic anemia, rheumatoid arthritis, Sjogren's disease, scleroderma and tissues. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:12 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1237 of SEQ ID NO:12, b is an integer of 15 to 1251, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:12, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 3

The translation product of this gene shares sequence homology with glycosyl transferase, which is thought to be important in glycosylation of proteins (See Genbank Accession No. g2996578).

This gene is expressed primarily in osteoclastoma cells, melanocytes, haemopoietic cells and colon tissue, and, to a lesser extent, in several other tissues and organs.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, disorders of the skin, blood, skeletal system and cancer. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the haemopoietic system, epithelium and skeletal system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, musculo-skeletal, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 113 as residues: Glu-136 to Pro-141, Ala-221 to Ser-227, Asp-307 to Pro-312, Lys-355 to Gly-361, Phe-449 to Pro-454.

The tissue distribution in musculo-skeletal and immune tissues, and the homology to glycosyl transferase protein, suggests that polynucleotides and polypeptides corresponding to this gene are useful for the treatment and/or diagnosis of disorders of the haemopoietic, skeletal and epithelial systems, and cancers thereof, as well as disorders associated with incorrect post-translational modification of proteins (i.e. glycosylation). Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:13 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically

excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1720 of SEQ ID NO:13, b is an integer of 15 to 1734, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:13, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 4

The translation product of this gene shares sequence homology with human pleckstrin protein (See Genbank Accession No. g35518), which is thought to be important in platelet formation or activity. Therefore, it is likely that this gene also has activity in platelets.

This gene is expressed primarily in keratinocytes, and, to a lesser extent, in spleen and bone marrow.

Therefore, nucleic acids of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of the following diseases and conditions which include, but are not limited to, immune and clotting disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune and blood clotting systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, blood clotting, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 114 as residues: Leu-38 to Gly-49, Lys-75 to Thr-80.

The tissue distribution in keratinocytes, spleen and bone marrow, and the homology to pleckstrin suggests that polynucleotides and polypeptides corresponding to this gene are useful for the study, diagnosis and/or treatment of immune system and

clotting disorders. Furthermore, since this protein is 50% identical to the Pleckstrin protein, it is an excellent candidate for a protein kinase C substrate. Identification of this protein as a target of protein kinase C, and the exploration of its role in protein kinase C mediated responses, such as inflammation, may lead to a better
5 understanding of the inflammatory response. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets
10 for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:14 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically
15 excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1526 of SEQ ID NO:14, b is an integer of 15 to 1540, where both a and b correspond to the positions of nucleotide
20 residues shown in SEQ ID NO:14, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 5

The gene encoding the disclosed cDNA is thought to reside on chromosome 17. Accordingly, polynucleotides related to this invention are useful as a marker in
25 linkage analysis for chromosome 17.

This gene is expressed primarily in infant liver/spleen tissues, T cells, bone marrow stromal cells, and thymus tissue, and, to a lesser extent, in brain and tonsils tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as
30 reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, various immune system disorders and/or diseases. Similarly,

polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 115 as residues: Ser-46 to Arg-54.

The tissue distribution in liver/spleen tissues, T-cells, bone marrow stromal cells, and thymus tissue suggests that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and/or treatment of a variety of cancers, most notably cancers of the immune system. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, the expression of this gene product in a variety of cells of the immune system suggests that this gene may be a player in the progression of these diseases, and may be a beneficial target for inhibitors as therapeutics. Furthermore, the tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the treatment and/or diagnosis of hematopoietic related disorders such as anemia, pancytopenia, leukopenia, thrombocytopenia or leukemia, since stromal cells are important in the production of cells of hematopoietic lineages.

The uses include bone marrow cell ex vivo culture, bone marrow transplantation, bone marrow reconstitution, radiotherapy or chemotherapy of neoplasia. The gene product may also be involved in lymphopoiesis, therefore, it can be used in immune disorders such as infection, inflammation, allergy, immunodeficiency etc. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue

markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

- 5 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:15 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is
10 cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1544 of SEQ ID NO:15, b is an integer of 15 to 1558, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:15, and where b is greater than or equal to a + 14.

15

FEATURES OF PROTEIN ENCODED BY GENE NO: 6

- The translation product of this gene shares sequence homology with angiopoietin-2, an anti-angiogenic factor. See, for example, Maisonpierre, et al., Angiopoietin-2, a natural antagonist for Tie2 that disrupts in vivo angiogenesis.
20 Science. (1997) 277(5322): 55-60, incorporated herein by reference in its entirety. Based on the sequence similarity, the translation product of this gene is expected to share certain biological activities with Angiopoietin-2 as may be assessed by assays known in the art and described herein.

- 25 Preferred polypeptides of the invention comprise the following amino acid sequence:

MFTIKLLLFIIVPLVISSRIDQDNSSFDLSPEPKSRFAMLDDVKILANGLLQLGH
GLKDFVHKTKGQINDIFQKLNIFDQSFYDLSLQTSEIKEEEEKELRRTTYKLQVK
NEEVKNMSLELNSKLESLLLEEKILLQQKVYLEEQLTNLIQNQPETPEHPEVTS
LKTFVEKQDNSIKDLLQTVEDQYKQLNQHSQIKEIENQLRRTSIQEPTEISLSS
30 KPRAPRTTPFLQLNEIRNVKHDGIPAECTTIYNRGEHTSGMYAIRPSNSQVFHV
YCDVISGSPWTLIQHRIDGSQNFNETWENYKYGFGRLDGEFWLGLEKIYSIVK
QSNYVLRIELEDWKDNKHIEYSFYLGNHETNYTLHLVAITGNVPNAIPENK

- DLVFSTWDHKAKGHFNCPEGYSGGWWHDECGENNLNGKYNKPRAKSKP
 ERRRGLSWKSQNGRLYSIKSTKMLIHPTDSESFE (SEQ ID NO: 218),
 MFTIKLLLFIPLVISSRIDQDNSSFDSLSPKSRF (SEQ ID NO: 219),
 AMLDDVKILANGLLQLGHGLKDFVHKTGQINDI (SEQ ID NO: 220),
 5 FQKLNIFDQSFYDLSLQTSEIKKEELRRTTYKL (SEQ ID NO: 221),
 QVKNEEVKNMSLELNSKLESLLKILLQKVKYLE (SEQ ID NO: 222),
 EQLTNLIQNQPETPEHPEVTSKTFVEKQDNSIKDL (SEQ ID NO: 223),
 LQTVEDQYKQLNQHSQIKEIENQLRRTSIQEPTE (SEQ ID NO: 224),
 ISLSSKPRAPRTTPFLQLNEIRNVKHDGIPAECTT (SEQ ID NO: 225),
 10 IYNRGEHTSGMYAIRPSNSQVFHVYCDVISGSPWTL (SEQ ID NO: 226),
 IQHRIDGSQNFNETWENYKYGFGRLDGEFWLGLEKI (SEQ ID NO: 227),
 YSIVKQSNYVLRIELEDWKDNKHIEYSFYLGHE (SEQ ID NO: 228),
 TNYTLHLVAITGNVPNAIPENKDLVFSTWDHKAKG (SEQ ID NO: 229),
 HFNCPEGYSGGWWHDECGENNLNGKYNKPRAKSKP (SEQ ID NO: 230),
 15 and/or ERRRGLSWKSQNGRLYSIKSTKMLIHPTDSESFE (SEQ ID NO: 231).

Also preferred are the polynucleotides encoding these polypeptides. The gene encoding the disclosed cDNA is believed to reside on chromosome 1. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 1.

- 20 This gene is expressed primarily in liver.

- Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, angiogenesis and neovascularisation associated with tumour
 25 development. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the vascular system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., vascular, liver,
 30 cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e.,

the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 116 as residues: Arg-18 to Asp-27, Leu-29 to Arg-36, Ser-90 to Tyr-104, Val-108 to
5 Lys-114.

The tissue distribution primarily in liver and homology to angiopoietin-2 indicates that the protein products of this gene are useful for the treatment and/or detection of disorders associated with angiogenesis including the inhibition of angiogenesis and neovascularisation associated with tumour development; the
10 promotion of neovascularisation and wound healing; the treatment of ischaemia; thromboembolytic disease; atherosclerosis; inflammation; and diabetes. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue
15 markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are
20 related to SEQ ID NO:16 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general
25 formula of a-b, where a is any integer between 1 to 1622 of SEQ ID NO:16, b is an integer of 15 to 1636, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:16, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 7

30 Preferred polypeptides of the invention comprise the following amino acid sequence: LPPRGPATFGSPGCPPANSPPSAPATPE PARAPERV (SEQ ID NO: 232). Polynucleotides encoding these polypeptides are also provided.

When tested against fibroblast cell lines, supernatants removed from cells containing this gene activated the EGR1 assay. Thus, it is likely that this gene activates fibroblast cells through a signal transduction pathway. Early growth response 1 (EGR1) is a promoter associated with certain genes that induces various tissues and cell types upon activation, leading the cells to undergo differentiation and proliferation. The translation product of this gene shares sequence homology with murine claudin-1 and other murine and human members of the claudin family of integral membrane proteins which are structurally similar and contain four transmembrane domains (e.g., See Genbank Acc. Nos. gi3335182 (AF072127) and/or gi4128015|gnl|PIDle1363658). Three integral membrane proteins, claudin-1, -2, and occludin, are known to be components of tight junction (TJ) strands. FLAG-tagged claudin-1 and -2 protein have been demonstrated using immunofluorescence microscopy to be highly concentrated at cell contact sites as planes through a homophilic interaction. It is believed that claudin-1 and -2 are mainly responsible for TJ strand formation, and occludin is an accessory protein in some function of TJ strands (See, J. Cell Biol 143:391-401 (1998), which is hereby incorporated by reference herein).

This gene is expressed primarily in wound healing tissues, and various carcinoma tissues, and, to a lesser extent, in some other tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, tumorigenesis. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of wounded tissues, and cancerous tissues, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in healing wound tissue and various carcinomas indicates that the protein products of this gene are useful for detection, treatment, and/or prevention of wounds and tumors. Representative uses are described elsewhere herein. Additionally, the homology of the translation product of this gene to claudin-1, a integral membrane protein involved in tight junction formation, and the biological activity of supernatants from cells expressing this gene on fibroblast cells in EGR assays indicate that polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of cancer and other proliferative disorders. Expression within cellular sources marked by proliferating cells (e.g., healing wound and various carcinomas) and the homology of the translation product of this gene to a family of claudin proteins suggests that this protein may play a role in the regulation of cellular division and tight junction formation. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:17 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1242 of SEQ ID NO:17, b is an integer of 15 to 1256, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:17, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 8

The translation product of this gene shares sequence homology with fibulin which is thought to be important in cellular adhesion and extracellular matrix organization.

- Preferred polypeptides of the invention comprise the following amino acid sequence: GTRAGVSKYTGGRGVTWAPSSAAVPRISSATMRMGLTSFSTTGA (SEQ ID NO: 233),
- WQSGHRLWQLEWPPPPLSADEHPWEGPLPGTSPSPKFSPVPHGHRPTL
- 5 TMTRSWRIFNNIA
- YRSSSANRLFRVIRREHGDPLIEELNPGDALEPEGRGTGGVVTDFDGDGMLDL
- ILSHGESMAQPLSVFRG
- NQGFNNNWLRVVPRTFRGAFARGAKVVLYTKKSGAHLRIIDGGSGYLCEME
- PVAHFGLGKDEASSVEVTW
- 10 PDGKMVSRNVASGEMNSVLEILYPRDEDTLQDPAPLECGQGFSQQENGHCMDTNECIQFPFVCPRDKPVC VNTYGSYRCRTNKKCSXGLRVPTRMAHTGL
- (SEQ ID NO: 234), WQSGHRLWQLEWPPPPLSADEHPWEGPLPGTSPSPK (SEQ ID NO: 235), FSMPSVPHGHRPTLTMTRSWRIFNNIAYRSSS (SEQ ID NO: 236), ANRLFRVIRREHGDPLIEELNPGDALEPEGRGTGGVV (SEQ ID NO: 237),
- 15 TDFDGDGMLDLILSHGESMAQPLSVFRGNQGFNN (SEQ ID NO: 238),
- NWLRVVPRTFRGAFARGAKVVLYTKKSGAHLRIID (SEQ ID NO: 239),
- GGSGYLCEMEPVAHFGLGKDEASSVEVTWPDGKMVS (SEQ ID NO: 240),
- RNVASGEMNSVLEILYPRDEDTLQDPAPLECGQGF (SEQ ID NO: 241),
- SQQENGHCMDTNECIQFPFVCPRDKPVCVNTYGSYR (SEQ ID NO: 242),
- 20 and/or CRTNKKCSXGLRVPTRMAHTGL (SEQ ID NO: 243). Polynucleotides encoding these polypeptides are also provided.

The gene encoding the disclosed cDNA is believed to reside on chromosome 10. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 10.

- 25 This gene is expressed primarily in brain.

- Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, thrombosis, atherosclerosis, neoplasia, schizophrenia, Alzheimer's
- 30 disease, Parkinson's disease, Huntington's disease, transmissible spongiform encephalopathies (TSE), Creutzfeldt-Jakob disease (CJD), specific brain tumors, aphasia, mania, depression and dementia. Similarly, polypeptides and antibodies

- directed to these polypeptides are useful to provide immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the central nervous and cardiovascular systems, expression of this gene at significantly higher or lower levels may be
- 5 routinely detected in certain tissues or cell types (e.g., brain, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid or cerebrospinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.
- 10 The tissue distribution in brain and the homology to fibulin suggests that the protein product of this gene is useful for the treatment and diagnosis of developmental, degenerative and/or neoplastic conditions (such as cancer) with mechanisms contingent on the regulation of cellular adhesion and extracellular matrix organization. Fibulin itself, can be used to manipulate adhesion of cells to fibronectin,
- 15 collagen, laminin, and possibly also other proteins. Thrombosis, atherosclerosis and restenosis may be potential cardiovascular targets for application. In addition polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of neurodegenerative disease states, behavioral disorders, or inflammatory conditions.
- 20 Representative uses are described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Briefly, the uses include, but are not limited to the detection, treatment, and/or prevention of Alzheimer's Disease, Parkinson's Disease, Huntington's Disease, Tourette Syndrome, meningitis, encephalitis, demyelinating
- 25 diseases, peripheral neuropathies, neoplasia, trauma, congenital malformations, spinal cord injuries, ischemia and infarction, aneurysms, hemorrhages, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, depression, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception. In addition, elevated
- 30 expression of this gene product in regions of the brain indicates it plays a role in normal neural function. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or

receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

5 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:18 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is
10 cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1129 of SEQ ID NO:18, b is an integer of 15 to 1143, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:18, and where b is greater than or equal to a + 14.

15

FEATURES OF PROTEIN ENCODED BY GENE NO: 9

The translation product of this gene shares sequence homology with carbonic anhydrase VI, which is thought to be important in protein degradation and pH regulation (see e.g., EMBL locus BTCARANVI, accession X96503; and Jiang et al.,
20 Biochem. J. 318:291-296 (1996) which is hereby incorporated herein, by reference). Based on this homology, it is likely that this gene would have activity similar to carbonic anhydrase.

Preferred polypeptides of the invention comprise the following amino acid sequence: GQHWTYEGPHGQDHWP (SEQ ID NO: 248), QSPIDIQTDSVTFD
25 (SEQ ID NO: 249), LHNNGHTVQLSLPST (SEQ ID NO: 250), KYVAAQLHLHWG (SEQ ID NO: 251), and/or AELHIVHYDSDSY (SEQ ID NO: 252). Polynucleotides encoding these polypeptides are also provided.

The gene encoding the disclosed cDNA is thought to reside on chromosome 1. Accordingly, polynucleotides related to this invention are useful as a marker in
30 linkage analysis for chromosome 1.

This gene is expressed primarily in fetal tissues and brain tissue, and, to a lesser extent, in melanocytes, wilms tumor and retinal tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, glaucoma and alkalosis resulting from disease of the kidney. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the systems regulating ionic balance and pH in the fluids of the body, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., metabolic, regulatory, renal, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 119 as residues: Tyr-24 to His-32, Pro-38 to Ala-44, Pro-66 to Glu-75, His-111 to Gly-116, Tyr-139 to Ser-146, Thr-176 to Ser-181, Lys-239 to Lys-249.

The tissue distribution and homology to secreted carbonic anhydrase suggests that polynucleotides and polypeptides corresponding to this gene are useful for developing drugs that modulate ionic balance in the serum and in the retina, and may be used for treating diseases such as glaucoma or alkalosis secondary to renal disease. Representative uses are described elsewhere herein. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO: 19 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is

cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1523 of SEQ ID NO:19, b is an integer of 15 to 1537, where both a and b correspond to the positions of nucleotide
5 residues shown in SEQ ID NO:19, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 10

The translation product of this gene shares sequence homology with murine CD63/ME491 which is thought to be important in activation of macrophage and
10 platelet population (marker of); CD37 (Genbank Acc. No. gil29794), a human leukocyte marker; and several members of the tetraspanin protein family (See, e.g., Genbank Acc. No. gil3152703 (AF065389) and gil2995865 (AF053455)), which are expressed in a wide variety of species and regulate cell adhesion, migration, proliferation and differentiation.

15 The transmembrane 4 superfamily (TM4SF) which has at least 16 members is the second biggest subfamily among CD antigen superfamilies and activation antigens of T-cells. All TM4SF members contain four putative transmembrane domains, two extracellular loops, and two short cytoplasmic tails. They are variously expressed on
20 immature, early, mature, activated lymphocytes, monocytes, macrophages, granulocytes, platelets, eosinophils, basophils, certain leukemic and lymphoma cells, and a variety of other cells and tissues. CD9 cell surface protein is expressed by both hematopoietic and neural cells, and may play a role in intercellular signaling in the immune and nervous system. CD63 is a 53-Kd lysosomal membrane glycoprotein that
25 has been identified as a platelet activation molecule; it plays an important role in cell adhesion of platelets and endothelial cells.

Increased mRNA for CD63 antigen was found in atherosclerotic lesions of Watanabe heritable hyperlipidemic rabbits, suggesting a potential role of CD63 in progression of atherosclerosis. CD63 is also a mast cell marker. This gene also shares close homology with C33 antigen (CD82); CD82 was originally identified as the
30 target of several mAbs inhibitory to syncytium formation induced by human T-cell leukemia virus type I (HTLV-I), the etiological agent of adult T-cell leukemia. Therefore, this gene could be a target for the development of a drug for this leukemia.

CD81 is the target of an antiproliferative antibody. A diverse group of human cell lines, including hematolymphoid, neuroectodermal, and mesenchymal cells, express the CD81 protein.

Many of the lymphoid cell lines, in particular those derived from large cell lymphomas, were susceptible to the antiproliferative effects of the antibody. CD81 may therefore play an important role in the regulation of lymphoma cell growth. CD9, CD20, CD37, CD63, CD81 and CD82 have been implicated in the regulation of cell growth, adhesion, and signal transduction of B, T lymphocytes and some other non-lymphoid cells. They associate with CD2, CD21, CD4, CD8, MHC Class II molecules, integrins, and function as co-receptor for T, B and other lymphoid cells. Some TM4SF are leukocyte antigens, highly expressed in activated leukocytes, lymphocytes, and are highly specific surface markers for lymphoblastic leukemia, lymphoma, melanoma, and neuroblastoma. CD9 has been shown to be involved in cell motility and tumor metastasis. These antigens could be a valuable immunogen or target to implement active and passive immunotherapy in patients with cancer. Others have been shown to be involved in inhibition of prostate cancer metastasis.

Preferred polynucleotides of the invention comprise the following nucleic acid sequence:

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GGCCGCGCCGCGCTGCCGCGCCGCGCGCGATTCTGCTTCTCAGAAGAT
GCACTATTATAGATACTCTAACGCCAAGGTCAGCTGCTGGTACAAGTACC
TCCTTTTCAGCTACAACATCATCTTCTGATTGGCTGGAGTTGTCTTCCTTGG
AGTCGGGCTGTGGGCATGGAGCGAAAAGGGTGTGCTGTCCGACCTCACCA
AAGTGACCCGGATGCATGGAATCGACCCTGTGGTGCTGGTCCTGATGGTG
GGCGTGGTGATGTTACCCCTGGGGTTCGCCGGCTGCGTGGGGGCTCTGCG
GGAGAATATCTGCTTGCTCAACTTTTTCTGTGGCACCATCGTGCTCATCTT
CTTCCTGGAGCTGGCTGTGGCCGTGCTGGCCTTCCTGTTCCAGGACTGGGT
GAGGGACCGGTTCCGGGAGTTCTTCGAGAGCAACATCAAGTCCTACCGGG
ACGATATCGATCTGCAAAACCTCATCGACTCCCTTCAGAAAGCTAACCAG
TGCTGTGGCGCATATGGCCCTGAAAGACTGGGACCTCAGACGTCTACTTC
AATTGCAGCGGTGCCAGCTACAGCCGAGAGAATGCGGGGTCCCCTTCTCC
TGCTGCGTGCCAGATCCTGCGCAAAAAGTTGTGAACACACAGTGTGGATA
TGATGTCAGGATTCAGCTGAAGAGCAAGTGGGATGAGTCCATCTTCACGA
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AAGGCTGCATCCAGGCGCTGGAAAGCTGGCTCCCGCGGAACATTTACATT
GTGGCTGGCGTCTTCATCGCCATCTCGCTGTTGCAGATATTTGGCATCTTC
CTGGCAAGGACGCTGATCTCAGACATCGAGGCAGTGAAGGCCGGCCATCA
CTTCTGAGGAGCAGAGTTGAGGGAGCCGAGCTGAGCCACGCTGGGAGGC
5 CAGAGCCTTTCTCTGCCATCAGCCCTACGTCCAGAGGGAGAGGAGCCGAC
ACCCCCAGAGCCAGTGCCCCATCTTAAGCATCAGCGTGACGTGACCTCTC
TGTTTCTGCTTGCTGGTGCTGAAGACCAAGGGTCCCCCTTGTTACCTGCCC
AAACTTGTGACTGCATCCCTCTGGAGTCTACCCAGAGACAGAGAATGTGT
CTTTATGTGGGAGTGGTGACTCTGAAAGACAGAGAGGGCTCCTGTGGCTG
10 CCAGGAGGGCTTGACTCAGACCCCCTGCAGCTCAAGCATGTCTGCAGGAC
ACCTGGTCCCCCTCTCCCAGTGGCATCCCAAACATCTGCTTTGGGTCCATC
CCACATCTGTGGGTGGGCCCCGTGGGTAAGAAGGGAACCCACAGGCGTG
GAACAGGGCATCCTCTCTCCCATCCAAGCAAAGCCAGCATGGGGGCCTGC
CCGTAACGGGAGGCGGACGTGGCCCCGCTGGGCCTCTGAGTGCCAGCGCA
15 GTCTGCTGGGACATGCACATATCAGGGGTTGTTTGCAGGATCCTCAGCCA
TGTTCAAGTGAAGTAAGCCTGAGCCAGTGGCTGGACTGGTGCCACGGGAG
TGCTTGTCCTACTGTCCCCCTGTGTCCACCAGCTATTCTCCTGGCGCCGGA
ACTGCCTCTGGTCTTGATAGCATTAAAGCCCTGATTGGCCGGTGGCGCGGTG
GGCATGGTTCTTCACTGAGAGCCGGCTCTCCTTTTCTTAAAGTGTGTAAAT
20 AGTTTATTT (SEQ ID NO: 253).

Preferred polypeptides of the invention comprise the following amino acid sequence:

MHYRYRNAKVSQWKYLLFSYNIIFWLAGVVFLGVGLWAWSEKGVLSDL
TKVTRMHGIDPVVLVLMVGVMFTLGFAGCVGALRENICLLNFFCGTIVLIFF
25 LELAVAVLAFLFQDWVRDRFREFFESNIKSyrDDIDLQNLDSLQKANQCCGA
YGPEDWDLNVYFNCSGASYSREKCGVPFSCCPDPAQKVNTQCGYDVRIQ
LKSKWDESIFTKGCIQALESWLPRNIYTVAGVFIAISLLQIFGIFLARTLISDIEAV
KAGHHF (SEQ ID NO: 254). Polynucleotides encoding these polypeptides are also
provided.

30 The gene encoding the disclosed cDNA is believed to reside on chromosome 10. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 10.

This gene is expressed primarily in infant and human brain and, to a lesser extent, in pancreas islet cell tumor, Wilm's tumor, uterine cancer, and B cell lymphomas.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions: cancers and central nervous system disorders. Similarly, polypeptides and antibodies directed to those polypeptides are useful to provide immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the, immune, metabolic and central nervous system, expression of this gene at significantly higher or lower levels may be detected in certain tissues or cell types (e.g., CNS, cancerous and wounded tissues) or bodily fluids (e.g., lymph, bile, serum, plasma, urine, synovial fluid or spinal fluid) taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 120 as residues: Met-1 to Ala-9.

The tissue distribution in infant and human brain, and various tumors, and homology to murine CD63/ME491, human CD37, and tetraspanins indicates that the protein product of this gene is useful for the study, detection, treatment, and/or prevention of central nervous system diseases and cancers. Moreover, the expression within embryonic tissue and other cellular sources marked by proliferating cells, and its homology indicates this protein may play a role in the regulation of cellular division, and may show utility in the diagnosis, treatment, and/or prevention of developmental diseases and disorders, cancer, and other proliferative conditions.

Representative uses are described in the "Hyperproliferative Disorders" and "Regeneration" sections below and elsewhere herein. Briefly, developmental tissues rely on decisions involving cell differentiation and/or apoptosis in pattern formation. Dysregulation of apoptosis can result in inappropriate suppression of cell death, as occurs in the development of some cancers, or in failure to control the extent of cell death, as is believed to occur in acquired immunodeficiency and certain neurodegenerative disorders, such as spinal muscular atrophy (SMA). Because of

potential roles in proliferation and differentiation, this gene product may have applications in the adult for tissue regeneration and the treatment of cancers. It may also act as a morphogen to control cell and tissue type specification. Therefore, the polynucleotides and polypeptides of the present invention are useful in treating, 5 detecting, and/or preventing said disorders and conditions, in addition to other types of degenerative conditions. Thus this protein may modulate apoptosis or tissue differentiation and is useful in the detection, treatment, and/or prevention of degenerative or proliferative conditions and diseases.

The protein is useful in modulating the immune response to aberrant 10 polypeptides, as may exist in proliferating and cancerous cells and tissues. The protein can also be used to gain new insight into the regulation of cellular growth and proliferation. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional 15 supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:20 and may have been publicly available prior to conception of 20 the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 2658 of SEQ ID NO:20, b is an 25 integer of 15 to 2672, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:20, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 11

The translation product of this gene shares sequence homology to several 30 steroid receptor proteins (e.g., See Genbank Acc. Nos. gnllPIDle314174, gnllPIDle1154367 (AJ002030), and/or gnllPIDle257707).

Preferred polypeptides of the invention comprise the following amino acid sequence:

SGNLGSADGWAYIDVEVRRPWAFVGP GCSRSSGNGSTAYGLVGSPRWLSPF
HTGGAVSLPRRPRGP
5 GPVLGVARPCLRCVLRPEHYEPGSHYSGFAGRDASRAFTGDCSEAGLVDD
VSDLSAAEMLTLHNWLSFY
EKNYVCVGRVTGRFYGEDGLPTALTQVEAAITRGLEANKLQLQEKTFFPPC
NAEWSSARGSRLWCSQKS
GGVSRDWIGVPRKLYKPGAKEPRCVCVRTTGPPSGQMPDNPPHRNRGDLDH
10 PNLAEYTGCPPLAITCSF L (SEQ ID NO: 255),
SGNLGSADGWAYIDVEVRRPWAFVGP GCSRSSGNGS (SEQ ID NO: 256),
TAYGLVGSPRWLSPFHTGGAVSLPRRPRGPGPVLGV (SEQ ID NO: 257),
ARPCLRCVLRPEHYEPGSHYSGFAGRDASRAFTGD (SEQ ID NO: 258),
CSEAGLVDDVSDLSAAEMLTLHNWLSFYEKNYVCVG (SEQ ID NO: 259),
15 RVTGRFYGEDGLPTALTQVEAAITRGLEANKLQLQ (SEQ ID NO: 260),
EKQTFPPCNAEWSSARGSRLWCSQKSGGVSRDWIGV (SEQ ID NO: 261),
PRKLYKPGAKEPRCVCVRTTGPPSGQMPD (SEQ ID NO: 262), and/or
NPPHRNRGDLDPNLAEYTGCPPLAITCSFPL (SEQ ID NO: 263).

Polynucleotides encoding these polypeptides are also provided.

20 This gene is expressed primarily in brain and, to a lesser extent, in variety of other tissues and cell types.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are
25 not limited to, developmental, degenerative and behavioral diseases of the brain such as schizophrenia, Alzheimer's disease, Parkinson's disease, Huntington's disease, transmissible spongiform encephalopathies (TSE), Creutzfeldt-Jakob disease (CJD), specific brain tumors, aphasia, mania, depression, dementia, paranoia, addictive behavior and sleep disorders. Similarly, polypeptides and antibodies directed to these
30 polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the brain, expression of this gene at significantly higher

or lower levels may be routinely detected in certain tissues or cell types (e.g., cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 121 as residues: Glu-42 to Pro-53, Ser-67 to Thr-73, Ala-84 to Leu-90.

The tissue distribution in brain and the homology to steroid receptor proteins indicates polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of neurodegenerative disease states, behavioral disorders, or inflammatory conditions. Representative uses are described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Briefly, the uses include, but are not limited to the detection, treatment, and/or prevention of Alzheimer's Disease, Parkinson's Disease, Huntington's Disease, Tourette Syndrome, meningitis, transmissible spongiform encephalopathy (TSE), Creutzfeldt-Jakob disease (CJD), aphasia, specific brain tumors, encephalitis, demyelinating diseases, peripheral neuropathies, neoplasia, trauma, congenital malformations, spinal cord injuries, ischemia and infarction, aneurysms, hemorrhages, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, depression, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception. In addition, elevated expression of this gene product in regions of the brain indicates it plays a role in normal neural function. Potentially, this gene product is involved in synapse formation, neurotransmission, learning, cognition, homeostasis, or neuronal differentiation or survival. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:21 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1494 of SEQ ID NO:21, b is an integer of 15 to 1508, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:21, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 12

This gene is expressed primarily in kidney and gall bladder tissues, fetal tissue, and testes tissue.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, renal disorders, metabolic diseases, and disorders of the reproductive and developing organs. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the renal, metabolic, developing, and reproductive systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., renal, metabolic, reproductive, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 122 as residues: Lys-60 to Ala-66.

The tissue distribution in kidney and gall bladder tissues, testicular tissue, and fetal tissues, suggests that polynucleotides and polypeptides corresponding to this gene are useful for treatment and diagnosis of disorders of the renal system, reproductive system, metabolic system and developing systems. Furthermore, the
5 tissue distribution in kidney suggests that this gene or gene product is useful in the treatment and/or detection of kidney diseases including renal failure, nephritis, renal tubular acidosis, proteinuria, pyuria, edema, pyelonephritis, hydronephritis, nephrotic syndrome, crush syndrome, glomerulonephritis, hematuria, renal colic and kidney stones, in addition to Wilm's Tumor Disease, and congenital kidney abnormalities
10 such as horseshoe kidney, polycystic kidney, and Falconi's syndrome.

Alternatively, the tissue distribution indicates that polynucleotides and polypeptides corresponding to this gene are useful for the treatment and diagnosis of conditions concerning proper testicular function (e.g., endocrine function, sperm maturation), as well as cancer. Therefore, this gene product is useful in the treatment
15 of male infertility and/or impotence. This gene product is also useful in assays designed to identify binding agents, as such agents (antagonists) are useful as male contraceptive agents. Similarly, the protein is believed to be useful in the treatment and/or diagnosis of testicular cancer. The testes are also a site of active gene expression of transcripts that may be expressed, particularly at low levels, in other
20 tissues of the body. Therefore, this gene product may be expressed in other specific tissues or organs where it may play related functional roles in other processes, such as hematopoiesis, inflammation, bone formation, and kidney function, to name a few possible target indications. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed
25 tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:22 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically
30 excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general

formula of a-b, where a is any integer between 1 to 1433 of SEQ ID NO:22, b is an integer of 15 to 1447, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:22, and where b is greater than or equal to a + 14.

5 FEATURES OF PROTEIN ENCODED BY GENE NO: 13

Preferred polypeptides of the invention comprise the following amino acid sequence: RDNDYLLHGHRRPPMF (SEQ ID NO: 264), SFRACFKSIFRIHTETGNIWTHLL (SEQ ID NO: 265), and/or GFVLFLFLGILTMLRPNMYFMAPLQEKVV (SEQ ID NO: 266). Polynucleotides
10 encoding these polypeptides are also provided.

The gene encoding the disclosed cDNA is thought to reside on chromosome 1. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 1.

This gene is expressed primarily in bone marrow, fetal liver and spleen
15 tissues, several types of leukocytes including neutrophils, and T-cells, placental tissue, and brain tissue.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are
20 not limited to, diseases and/or disorders of the immune system and central nervous system including AIDS, Lupus, hemotological cancers, mood disorders, and dementia. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of
25 the immune system and central nervous system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, neural, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression
30 level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 123 as residues: Glu-24 to Tyr-35, Arg-83 to Thr-92, Pro-148 to Gly-154.

The tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of a variety of immune system disorders. Representative uses are described in the “Immune Activity” and “Infectious Disease” sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, the expression of this gene product in fetal liver and spleen tissues, and several types of leukocytes, suggests a role in the regulation of the proliferation; survival; differentiation; and/or activation of potentially all hematopoietic cell lineages, including blood stem cells. This gene product may be involved in the regulation of cytokine production, antigen presentation, or other processes that may also suggest a usefulness in the treatment of cancer (e.g. by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the gene or protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Alternatively, the tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection/treatment of neurodegenerative disease states and behavioural disorders such as Alzheimers Disease, Parkinsons Disease, Huntingtons Disease, Tourette Syndrome, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception.

In addition, the gene or gene product may also play a role in the treatment and/or detection of developmental disorders associated with the developing embryo, or sexually-linked disorders. Furthermore, the protein may also be used to determine biological activity, to raise antibodies. as tissue markers, to isolate cognate ligands or

receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

- 5 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:23 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is
10 cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1569 of SEQ ID NO:23, b is an integer of 15 to 1583, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:23, and where b is greater than or equal to a + 14.

15

FEATURES OF PROTEIN ENCODED BY GENE NO: 14

The translation product of this gene shares sequence homology with gp25L, which is thought to be important in protein processing.

- 20 This gene is expressed primarily in stimulated synovium, cerebellum, and placental tissues, and, to a lesser extent, in several other tissues and organs.

- 25 Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, inflammation, disorders of developing systems, central nervous system, and musculo-skeletal system. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential
30 identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune, central nervous system, musculo-skeletal, and developing systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, neural, musculo-skeletal, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample

taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

5 The tissue distribution and homology to gp25L suggests that the protein product of this gene is useful for treatment and/or diagnosis of disorders of immune, central nervous system, musculo-skeletal, and developing systems. In addition, the expression of this gene product in synovium suggests a role in the detection and treatment of disorders and conditions affecting the skeletal system, in particular osteoporosis as well as disorders afflicting connective tissues (e.g., arthritis, trauma, tendonitis, chondromalacia and inflammation), such as in the diagnosis or treatment of various autoimmune disorders such as rheumatoid arthritis, lupus, scleroderma, and dermatomyositis as well as dwarfism, spinal deformation, and specific joint abnormalities as well as chondrodysplasias (i.e., spondyloepiphyseal dysplasia congenita, familial arthritis, Atelosteogenesis type II, metaphyseal chondrodysplasia type Schmid). Furthermore, the protein may also be used to determine biological activity, raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

20 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:24 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1655 of SEQ ID NO:24, b is an integer of 15 to 1669, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:24, and where b is greater than or equal to a + 14.

30

FEATURES OF PROTEIN ENCODED BY GENE NO: 15

This gene is expressed primarily in immune and hematopoietic cells, and breast and brain tissues, and, to a lesser extent, in several other tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, immune and hematopoietic disorders, disorders of the central nervous system and reproductive organs. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, hematopoietic, central nervous system and reproductive system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, reproductive, neural, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in breast, brain, and immune tissues suggests that polynucleotides and polypeptides corresponding to this gene are useful for the treatment and/or diagnosis of disorders of the immune, hematopoietic, central nervous and reproductive systems. Furthermore, the protein may also be used to determine biological activity, raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:25 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or

more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1039 of SEQ ID NO:25, b is an integer of 15 to 1053, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:25, and where b is greater than or equal to a + 14.

5

FEATURES OF PROTEIN ENCODED BY GENE NO: 16

Preferred polypeptides fragments from this alternative reading frame comprise:

- 10 TGPEFPGSNSTVARRIKDLAADIEEELVCRLKICDGFSLQLDESADVSGLA VLL
VFVRYRFNKSIEED
LLLCESLQSNATGEEIFNCINSFMQKHEIEWEKCVDVCSDASRAVDGKIAEAV
TLIKYVAPESTSSHCLL
YRHALAVKIMPTSLKNVLDQAVQIINYIKARPHQSRLKILCEEMGAQHTALL
15 LNTEVRWLSRGKVLVRL
FELRRELLVFMDSAFRLSDCLTNSSWLLRLAYLADIFTKLNEVNLSMQGKNV
TVFTVFDKMSSLLRKLEF
WASSVEEENFDCFPTLSDFLTEINSTVDKDICS AIVQHLRGLRATLLKYFPVTN
DNNAWVRNPFTVTVKP
20 ASLVARDYESLIDLTSDSQVKQNFSELSLNDFWSSLIQEYPSIARRAVRVLLPF
ATMHL CETGFSYYAAT
KTKYRKRLDAAPHMRIRLSNITPNIKRICDKKTQKHCSH (SEQ ID NO: 267),
DIEEELVCRLKICDGFSLQLDESADVSGLA V (SEQ ID NO: 268),
NSFMQKHEIEWEKCVDVCSDASRAVDGKIAEAVTLI (SEQ ID NO: 269),
25 LDQAVQIINYIKARPHQSRLKILCEEMGAQHTALL (SEQ ID NO: 270),
SAFRLSDCLTNSSWLLRLAYLADIFTKLNEVNLSMQGKNVTVFTVFDKM
(SEQ ID NO: 271), SDFLTEINSTVDKDICS AIVQHLRGLRATLLK (SEQ ID NO:
272), and/or SDSQVKQNFSELSLNDFWSSLIQEYPSIARRAVRVLLP (SEQ ID
NO: 273). Also preferred are polynucleotide fragments encoding these polypeptide
30 fragments.

The gene encoding the disclosed cDNA is believed to reside on chromosome 11. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 11.

This gene is expressed primarily in spleen from a chronic lymphocytic
5 leukemia patient, and hodgkin's lymphoma, and, to a lesser extent, in pancreatic islet cell tumors and activated T cells.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are
10 not limited to, chronic lymphocytic leukemia; hodgkin's lymphoma; pancreatic islet cell cancer; cancer in general; hematopoietic disorders; immune dysfunction.

Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the
15 immune system and pancreas, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., hematopoietic, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e.,
20 the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in spleen from a chronic lymphocytic leukemia patient, and hodgkin's lymphoma, pancreatic islet cell tumors, and activated T-cells. Representative uses are described in the "Immune Activity" and "Infectious Disease"
25 sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, the protein product of this gene is useful for the diagnosis and/or treatment of a variety of cancers, including CLL; Hodgkin's lymphoma; and pancreatic cancer. Expression of this gene product in a variety of cancers suggests that it may be a bad player and may likely be a target for inhibitors as therapeutics. Alternately, this gene
30 product may be expressed in both normal and abnormal hematopoietic tissues, where it may play necessary roles in the proliferation; survival; differentiation; or activation of hematopoietic cell lineages. Likewise, expression in pancreatic islet cell tumors

may simply reflect a necessary role that this protein plays in normal pancreatic function. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:26 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1463 of SEQ ID NO:26, b is an integer of 15 to 1477, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:26, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 17

When tested against U937 Myeloid cell lines, supernatants removed from cells containing this gene activated the GAS assay. Thus, it is likely that this gene activates myeloid cells, and to a lesser extent other cells, through the Jak-STAT signal transduction pathway. The gamma activating sequence (GAS) is a promoter element found upstream of many genes which are involved in the Jak-STAT pathway. The Jak-STAT pathway is a large, signal transduction pathway involved in the differentiation and proliferation of cells. Therefore, activation of the Jak-STAT pathway, reflected by the binding of the GAS element, can be used to indicate proteins involved in the proliferation and differentiation of cells.

This gene is expressed primarily in endometrial tumor tissue and cartilage tissue, and to a lesser extent in several other tissues and organs.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are

not limited to tumors and disorders of the musculo-skeletal system. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the musculo-skeletal system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., musculo-skeletal, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 127 as residues: Met-1 to Ser-8.

The tissue distribution in musculo-skeletal tissues and biological activity in the GAS assay, suggests that polynucleotides and polypeptides corresponding to this gene are useful for the treatment and/or diagnosis of disorders of the musculo-skeletal system, and cancers thereof. In addition, the expression of this gene product in cartilage tissue suggests a role in the detection and treatment of disorders and conditions affecting the skeletal system, in particular osteoporosis as well as disorders afflicting connective tissues (e.g., arthritis, trauma, tendonitis, chondromalacia and inflammation), such as in the diagnosis or treatment of various autoimmune disorders such as rheumatoid arthritis, lupus, scleroderma, and dermatomyositis as well as dwarfism, spinal deformation, and specific joint abnormalities as well as chondrodysplasias (i.e., spondyloepiphyseal dysplasia congenita, familial arthritis, Atelosteogenesis type II, metaphyseal chondrodysplasia type Schmid). Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are

related to SEQ ID NO:27 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or
5 more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 2490 of SEQ ID NO:27, b is an integer of 15 to 2504, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:27, and where b is greater than or equal to a + 14.

10 **FEATURES OF PROTEIN ENCODED BY GENE NO: 18**

The gene encoding the disclosed cDNA is thought to reside on chromosome 17. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 17.

This gene is expressed primarily in breast and cerebellum tissues, as well as in
15 cells of the hematopoietic system, and, to a lesser extent, in several other organs and tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are
20 not limited to, disorders of the brain, reproductive system and hematopoietic system. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune and hematopoietic system, central nervous system and reproductive system,
25 expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, neural, reproductive, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression
30 level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 128 as residues: Gly-56 to Gly-86, Leu-107 to Ala-112, Ala-121 to Thr-129, Lys-164 to Gln-174.

5 The tissue distribution in immune, reproductive, and neural tissues suggests that polynucleotides and polypeptides corresponding to this gene are useful for the treatment and/or diagnosis of disorders of the immune and haemopoietic system, the central nervous system, and the reproductive system. Furthermore, the expression in the breast tissue may indicate its uses in breast neoplasia and breast cancers, such as fibroadenoma, papillary carcinoma, ductal carcinoma, Paget's disease, medullary
10 carcinoma, mucinous carcinoma, tubular carcinoma, secretory carcinoma and apocrine carcinoma, as well as juvenile hypertrophy and gynecomastia, mastitis and abscess, duct ectasia, fat necrosis and fibrocystic diseases.

Alternatively, the tissue distribution in cerebellum tissue suggests that polynucleotides and polypeptides corresponding to this gene are useful for the
15 detection/treatment of neurodegenerative disease states and behavioural disorders such as Alzheimer's Disease, Parkinson's Disease, Huntington's Disease, Tourette Syndrome, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception. In addition, the
20 gene or gene product may also play a role in the treatment and/or detection of developmental disorders associated with the developing embryo, or sexually-linked disorders. In addition, the tissue distribution in immune system cells and tissues suggests that the translation product of this gene is useful for the detection and/or treatment of immune system disorders. This gene product may be involved in the
25 regulation of cytokine production, antigen presentation, or other processes that may also suggest a usefulness in the treatment of cancer (e.g., by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the gene or protein, as well as, antibodies directed against the protein may show utility as a tumor marker
30 and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory

bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:28 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1852 of SEQ ID NO:28, b is an integer of 15 to 1866, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:28, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 19

The translation product of this gene shares weak sequence homology with dehydrogenase enzymes (See, e.g., gnlIPIDe1316908) which are thought to be important in a variety of enzymatic conversions, including the biosynthesis of clavulanic acid from a precursor clavulanic acid aldehyde. The obtained clavulanic acid is in turn a key ingredient in antibiotics.

Preferred polypeptides of the invention comprise the following amino acid sequence: DSRISLLVNNAGVGATASLLESDADK (SEQ ID NO: 274). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in CD34 positive hematopoietic cells.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, hematopoietic diseases and/or disorders; impaired immune function; lymphomas & leukemias. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential

identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., hematopoietic, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 129 as residues: Pro-97 to Pro-113.

The tissue distribution in CD34 positive hematopoietic cells indicates that the protein product of this gene is useful for the diagnosis and/or treatment of a variety of hematopoietic disorders. Expression of this gene product specifically in CD34 positive cells suggests that it plays a role in early events of hematopoiesis, including proliferation; survival; differentiation; and activation of early stem and committed progenitor cells. The protein product of this gene is useful for the treatment and diagnosis of hematopoietic related disorders such as anemia, pancytopenia, leukopenia, thrombocytopenia or leukemia since stromal cells are important in the production of cells of hematopoietic lineages. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, the uses include bone marrow cell ex-vivo culture, bone marrow transplantation, bone marrow reconstitution, radiotherapy or chemotherapy of neoplasia. The gene product may also be involved in lymphopoiesis, therefore, it can be used in immune disorders such as infection, inflammation, allergy, immunodeficiency etc. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:29 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1487 of SEQ ID NO:29, b is an integer of 15 to 1501, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:29, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 20

Preferred polypeptides of the invention comprise the following amino acid sequence:

GTPAGTGPEFPGRPTRPSRTESAQTTQHSPLRPLWRLKRDSSPCHPQTRADWG
VCPPWGGAAQGLRPGCH
LAPRRCLCPGSCCPWHWAEAQWSFLWRGLWGLRTLPTALRASPAASGTVTY
SACLGTSCLLRAPCWRLRT CRQSWC (SEQ ID NO: 275),
GTPAGTGPEFPGRPTRPSRTESAQTTQH (SEQ ID NO: 276),
SPLRPLWRLKRDSSPCHPQTRADWGVCPW (SEQ ID NO: 277),
GGAAQGLRPGCHLAPRRCLCPGSCCPWHWA (SEQ ID NO: 278),
EAQWSFLWRGLWGLRTLPTALRASPAASGT (SEQ ID NO: 279), and/or
VTYSACLGTSCLLRAPCWRLRTCRQSWC (SEQ ID NO: 280). Polynucleotides encoding these polypeptides are also provided.

The gene encoding the disclosed cDNA is believed to reside on chromosome 3. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 3.

This gene is expressed primarily in osteoarthritis, breast cancer, and uterine cancer, and, to a lesser extent, in brain.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are

not limited to, cancer, particularly breast and uterine cancer; and neurological diseases and/or disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the breast, lymph node, and CNS, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., reproductive, breast, skeletal, joint, neural, and cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, amniotic fluid, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 130 as residues: Gln-75 to Cys-80.

The tissue distribution in breast and uterine cancer indicates that the protein product of this gene is useful for the diagnosis and/or treatment of a variety of cancers, particularly breast cancer and uterine cancer. Expression of this gene in brain also indicates that it may play a role in neurological function, and that its absence may lead to disorders such as Alzheimer's & Parkinson's disease. Expression of this gene product at elevated levels within cancerous tissue indicates that it may be a player in the progression of the disease, perhaps by driving proliferation or blocking differentiation or apoptosis. Therefore, beneficial therapeutics may be developed based upon attempts to block this gene product.

Representative uses are described in the "Hyperproliferative Disorders" and "Regeneration" sections below and elsewhere herein. Briefly, developmental tissues rely on decisions involving cell differentiation and/or apoptosis in pattern formation. Dysregulation of apoptosis can result in inappropriate suppression of cell death, as occurs in the development of some cancers, or in failure to control the extent of cell death, as is believed to occur in acquired immunodeficiency and certain neurodegenerative disorders, such as spinal muscular atrophy (SMA). Because of potential roles in proliferation and differentiation, this gene product may have applications in the adult for tissue regeneration and the treatment of cancers. It may

also act as a morphogen to control cell and tissue type specification. Therefore, the polynucleotides and polypeptides of the present invention are useful in treating, detecting, and/or preventing said disorders and conditions, in addition to other types of degenerative conditions. Thus this protein may modulate apoptosis or tissue differentiation and is useful in the detection, treatment, and/or prevention of degenerative or proliferative conditions and diseases. The protein is useful in modulating the immune response to aberrant polypeptides, as may exist in proliferating and cancerous cells and tissues. The protein can also be used to gain new insight into the regulation of cellular growth and proliferation. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:30 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1738 of SEQ ID NO:30, b is an integer of 15 to 1752, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:30, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 21

This gene shares sequence homology with a yeast hypothetical 52.9 KD protein CDC26-YMR31 intergenic region (See Genbank Accession No. gpID50617|YSCCHRVI_114.). This gene has been mapped to chromosome 18q22-23, and therefore can be used in linkage analysis as a marker for 18q22-23.

This gene is expressed primarily in whole brain tissue, as well as brain specific tissues such as hypothalamus, frontal cortex, cerebellum, amygdala, and hippocampus tissues, as well as other brain specific tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as
5 reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, schizophrenia, developmental disorders, and abnormal mental states. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell
10 type(s). For a number of disorders of the above tissues or cells, particularly of the central nervous system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., neural, brain, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having
15 such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 131 as residues: Met-98 to Gln-107, Gly-120 to Gly-126, Pro-138 to Trp-145, Leu-159 to Gly-169, Val-211 to Arg-217, Cys-256 to His-262, Glu-320 to Val-327, Phe-
20 399 to Asn-406, Asp-444 to Ser-450, Asp-475 to Trp-488.

The tissue distribution in whole brain tissue and brain specific tissues suggests that polynucleotides and polypeptides corresponding to this gene are useful for treating and/or diagnosing neural and neurodegenerative disorders. Furthermore, the tissue distribution suggests that polynucleotides and polypeptides corresponding to
25 this gene are useful for the detection/treatment of neurodegenerative disease states and behavioural disorders such as Alzheimers Disease, Parkinsons Disease, Huntingtons Disease, Tourette Syndrome, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance,
30 and perception. In addition, the gene or gene product may also play a role in the treatment and/or detection of developmental disorders associated with the developing embryo, or sexually-linked disorders. Elevated expression of this gene product within

the frontal cortex of the brain suggests that it may be involved in neuronal survival; synapse formation; conductance; neural differentiation, etc. Such involvement may impact many processes, such as learning and cognition. Additionally, the amygdala processes sensory information and relays this to other areas of the brain including the endocrine and autonomic domains of the hypothalamus and the brain stem. Thus, the translation product of this gene may also be useful for the detection and/or treatment of neural disorders that impact processes mediated by the amygdala. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:31 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 2138 of SEQ ID NO:31, b is an integer of 15 to 2152, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:31, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 22

Preferred polypeptides of the invention comprise the following amino acid sequence: PPRPSTSGQWG (SEQ ID NO: 281) and/or RRSPTSAQTG (SEQ ID NO: 282). Polynucleotides encoding these polypeptides are also provided.

The gene encoding the disclosed cDNA is thought to reside on chromosome 1. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 1.

This gene is expressed primarily in breast and soleus tissues, and, to a lesser extent, in several cell types, including T-cells.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are

not limited to, breast cancer, and musculo-skeletal diseases and/or disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the lactation system and breast, as well as the musculo-skeletal system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., musculo-skeletal, breast, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 132 as residues: Thr-35 to Lys-43, Pro-59 to Arg-64.

The tissue distribution in soleus tissue indicates that the protein product of this gene is useful for the detection, treatment, and/or prevention of conditions and pathologies of the cardiovascular system, such as heart disease, restenosis, atherosclerosis, stroke, angina, thrombosis, and wound healing. Representative uses are described elsewhere herein. Alternatively, the expression in the breast tissue may indicate its uses in breast neoplasia and breast cancers, such as fibroadenoma, papillary carcinoma, ductal carcinoma, Paget's disease, medullary carcinoma, mucinous carcinoma, tubular carcinoma, secretory carcinoma and apocrine carcinoma, as well as juvenile hypertrophy and gynecomastia, mastitis and abscess, duct ectasia, fat necrosis and fibrocystic diseases. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:32 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically

excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1743 of SEQ ID NO:32, b is an integer of 15 to 1757, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:32, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 23

The gene encoding the disclosed cDNA is believed to reside on chromosome 3. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 3.

Preferred polypeptides of the invention comprise the following amino acid sequence: GTGWDFGLAAVCLRAAEVAGSFK (SEQ ID NO: 283), GYRRVFEEYMRVISQRYPDIRIEGENYLPQPIYRHIASFLSVFKLVLIIGLIIVGKDPFAFFGMQAPSI (SEQ ID NO: 284), WQWGQENKVYACMMVFFLSNMIENQCMSTGAFEITLNDVPVWSKLESGHLPSMQQLVQILDNEMKLVHMDSIPHRS (SEQ ID NO: 285), GYRRVFEEYMRVISQRYPDIRIEGENYLPQPIYR (SEQ ID NO: 286), HIASFLSVFKLVLIIGLIIVGKDPFAFFGMQAPSI (SEQ ID NO: 287), WQWGQENKVYACMMVFFLSNMIENQCMSTGAFEI (SEQ ID NO: 288), TLNDVPVWSKLESGHLPSMQQLVQILDNEMKLVHMDSIPHRS (SEQ ID NO: 289). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in fast-growing tissues such as early development stage tissues, cancerous tissues, and hematopoietic tissues, and, to a lesser extent, in some other tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, growth disorders, tumorigenesis, and immune and inflammatory disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s)

or cell type(s). For a number of disorders of the above tissues or cells, particularly of the fast-growing tissues such as early development stage tissues, cancer tissues, and hematopoietic tissues, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., cancerous and wounded
5 tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in fast-growing tissues such as early development stage
10 tissues, cancerous tissues, and hematopoietic tissues, indicates that the protein products of this gene are useful for detection, treatment, and/or prevention of growth disorders, tumorigenesis, and immune and inflammatory disorders. Similarly, the tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of cancer and other
15 proliferative disorders. Expression in cellular sources marked by proliferating cells suggests that this protein may play a role in the regulation of cellular division. Additionally, the expression in hematopoietic cells and tissues suggests that this protein may play a role in the proliferation, differentiation, and/or survival of hematopoietic cell lineages. In such an event, this gene may be useful in the treatment
20 of lymphoproliferative disorders, and in the maintenance and differentiation of various hematopoietic lineages from early hematopoietic stem and committed progenitor cells. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly
25 available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:33 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or
30 more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1452 of SEQ ID NO:33, b is an

integer of 15 to 1466, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:33, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 24

5 Preferred polypeptides of the invention comprise the following amino acid sequence: GRARGRPPGPEAAPASLSVSLRREVHSRGE (SEQ ID NO: 290).

Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in olfactory epithelium.

Therefore, polynucleotides and polypeptides of the invention are useful as
10 reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, olfactory disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential
15 identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the olfactory system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., olfactory, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample
20 taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 134 as residues: His-24 to Ala-29, Glu-42 to Glu-49.

The tissue distribution primarily in the olfactory epithelium indicates a role for
25 this protein in the treatment and/or diagnosis of olfactory and sensory disorders, including loss of the sense of smell. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly
30 available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:34 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically

excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 512 of SEQ ID NO:34, b is an integer of 15 to 526, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:34, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 25

This gene is expressed primarily in 8 week embryo.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, developmental disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly during fetal development, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., embryonic, cancerous and wounded tissues) or bodily fluids (e.g., lymph, amniotic fluid, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The expression of this gene primarily in the embryo, indicates a key role for this protein in embryo development and further indicates its usefulness in the treatment and/or detection of embryonic developmental defects.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:35 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general

formula of a-b, where a is any integer between 1 to 2398 of SEQ ID NO:35, b is an integer of 15 to 2412, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:35, and where b is greater than or equal to a + 14.

5 FEATURES OF PROTEIN ENCODED BY GENE NO: 26

This gene is expressed primarily in neutrophils.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, disorders affecting the immune system. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

20 Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 136 as residues: Trp-25 to Thr-38, Pro-83 to Ala-88.

The tissue distribution in neutrophils suggests that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and/or treatment of immune system disorders, especially those affecting neutrophils. Furthermore, this gene product may be involved in the regulation of cytokine production, antigen presentation, or other processes that may also suggest a usefulness in the treatment of cancer (e.g. by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the gene or protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory

bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:36 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1260 of SEQ ID NO:36, b is an integer of 15 to 1274, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:36, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 27

The gene encoding the disclosed cDNA is thought to reside on chromosome 1. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 1.

This gene is expressed primarily in fetal liver and brain tissues, and, to a lesser extent, in various other fetal and transformed cell types.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, immune, developmental and neurological conditions. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the developing, immune and central nervous systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, developing, neural, cancerous and wounded tissues) or bodily

fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

- 5 Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 137 as residues: Pro-75 to Asn-81, Gln-106 to Cys-111, Glu-130 to Asp-141, Arg-176 to Asp-182, Ala-201 to Trp-206, Lys-238 to Thr-246.

- The tissue distribution in fetal liver and brain tissues suggests that polynucleotides and polypeptides corresponding to this gene are useful for the study, detection and/or treatment of growth disorders and neoplasias of the immune and central nervous systems. The tissue distribution indicates polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of neurodegenerative disease states, behavioral disorders, or inflammatory conditions.
- 10

- 15 Representative uses are described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Briefly, the uses include, but are not limited to the detection, treatment, and/or prevention of Alzheimer's Disease, Parkinson's Disease, Huntington's Disease, Tourette Syndrome, meningitis, encephalitis, demyelinating diseases, peripheral neuropathies, neoplasia, trauma, congenital malformations, spinal cord injuries, ischemia and infarction, aneurysms, hemorrhages, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, depression, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception. In addition, elevated expression of this gene product in regions of the brain indicates it plays a role in normal neural function. Potentially, this gene product is involved in synapse formation, neurotransmission, learning, cognition, homeostasis, or neuronal differentiation or survival. In addition, the gene or gene product may also play a role in the treatment and/or detection of developmental disorders associated with the developing embryo, or sexually-linked disorders.
- 20
- 25
- 30

Alternatively, expression of this gene product in fetal liver/spleen tissue suggests a role in the regulation of the proliferation; survival; differentiation; and/or

activation of potentially all hematopoietic cell lineages, including blood stem cells. This gene product may be involved in the regulation of cytokine production, antigen presentation, or other processes that may also suggest a usefulness in the treatment of cancer (e.g., by boosting immune responses).

- 5 Since the gene is expressed in cells of lymphoid origin, the gene or protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory
- 10 bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify
- 15 agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

- Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are
- 20 related to SEQ ID NO:37 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general
- 25 formula of a-b, where a is any integer between 1 to 1022 of SEQ ID NO:37, b is an integer of 15 to 1036, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:37, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 28

- 30 This gene shares sequence homology to fibulin (See GeneSeq Accession No. R11148 and R11149). Fibulin binds to the cytoplasmic domain of the beta-1 subunit of integrin adhesion receptors in a cation-dependent, EDTA-reversible manner. Thus,

this gene may be used to manipulate adhesion of cells to fibronectin, collagen, laminin, and possibly also other proteins. When tested against both U937 Myeloid cell lines and Jurkat T-cell cell lines, supernatants removed from cells containing this gene activated the GAS assay. Thus, it is likely that this gene activates both T-cells
5 and myeloid cells, and to a lesser extent other tissues and cell types, through the Jak-STAT signal transduction pathway. The gamma activating sequence (GAS) is a promoter element found upstream of many genes which are involved in the Jak-STAT pathway. The Jak-STAT pathway is a large, signal transduction pathway involved in the differentiation and proliferation of cells. Therefore, activation of the Jak-STAT
10 pathway, reflected by the binding of the GAS element, can be used to indicate proteins involved in the proliferation and differentiation of cells.

The gene encoding the disclosed cDNA is thought to reside on chromosome 3. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 3.

15 This gene is expressed primarily in cerebellum tissue, and, to a lesser extent, in multiple tissues and cell types including prostate, liver, T-cells, kidney, and lung tissues, as well as musculo-skeletal tissues such as endothelial tissue, healing groin wound tissue, fetal heart tissue, and osteosarcoma tissue.

Therefore, polynucleotides and polypeptides of the invention are useful as
20 reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, diseases and/or disorders of the central nervous system, including dementia, mood disorders, both unipolar and bipolar depression, and Alzheimer's disease, as well as disorders of the musculo-skeletal, renal, and pulmonary systems.
25 Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the central nervous system, renal, pulmonary system, and musculo-skeletal system, expression of this gene at significantly higher or lower levels may be routinely
30 detected in certain tissues or cell types (e.g., neural, musculo-skeletal, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such

a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 138 as residues: Pro-28 to Thr-45, Arg-59 to Gly-67, Ala-71 to Glu-84, Lys-120 to
5 Asp-126, Pro-159 to Gly-164, Glu-167 to Gly-186, Arg-217 to Asn-225, Glu-245 to Ala-255, Gly-282 to Gly-297, Pro-312 to Gly-324, Thr-356 to Lys-364, Gly-366 to Thr-372, Lys-377 to Ala-383, Gly-397 to Thr-407, Thr-419 to Gly-433.

The tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and/or treatment of a variety of
10 cancers, most notably cancers of the central nervous system, pulmonary, and renal systems, as well as the disorders of the central nervous system listed above.

Representative uses are described in the "Hyperproliferative Diseases", "Chemotaxis" and "Binding Activity" sections below, in Examples 11, 12, 13, 14, 15, 16, 18, 19, and 20, and elsewhere herein. Briefly, the expression of this gene product in a variety
15 of systems suggests that this gene may be a player in the progression of these diseases, and may be a beneficial target for inhibitors as therapeutics.

Alternatively, the tissue distribution in musculo-skeletal tissues, as the homology to fibulin, suggests that the translation product of this gene is useful for the detection and/or treatment of disorders involving the vasculature. Elevated expression
20 of this gene product by endothelial cells suggests that it may play vital roles in the regulation of endothelial cell function; secretion; proliferation; or angiogenesis. Alternately, this may represent a gene product expressed by the endothelium and transported to distant sites of action on a variety of target organs. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue
25 markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly
30 available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:38 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically

excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1365 of SEQ ID NO:38, b is an integer of 15 to 1379, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:38, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 29

The translation product of this gene shares sequence homology with coxsackie and adenovirus receptor in mouse. Particularly, this gene shares sequence homology with a human A33 antigen, which is a transmembrane protein and a novel member of the immunoglobulin superfamily. (See Proc. Natl. Acad. Sci. U.S.A. 94, 469-474 (1997); see also, Accession No. 1814277; all references available through the accession and reference are hereby incorporated herein by reference.) Therefore, this gene likely has activity similar to the human A33 antigen.

Preferred polypeptides of the invention comprise the following amino acid sequence:

MISLPGPLVTNLLRFLFLGLSALAPPSRAQLQLHLPANRLQAVEGGEVVLPAW
 YTLHGEVSSSQPWEVPFVMWFFKQKEKEDQVLSYINGVTTSKPGVSLVYSMP
 20 SRNLSLRLEGLQEKDSGPYSCSVNVQNKQGKSRGHSIKTLELNVLVPPAPPSC
 RLQGVPHVGANVTLSQCSPRSKPAVQYQWDRQLPSFQTFAPALDVIRGSLS
 LTNLSSSMAGVYVCKAHNEVGTAQCNVTLEVSTGPGAADVAGAVVGTLVG
 LGLLAGLVLLYHRRGKALEEPANDIKEDAIAPRTLWPWKSSDTISKNGTLSSV
 TSARALRPPHGP RP GAL TPTPSLSSQALPSPRLPTTDGAHPQPISPIPGGVSSSG
 25 LSRMGAVPVMVPAQSQAGSL (SEQ ID NO: 291),
 MISLPGPLVTNLLRFLFLGLSALAPPSRAQLQLHL (SEQ ID NO: 292),
 PANRLQAVEGGEVVLPAWYTLHGEVSSSQPWEVPF (SEQ ID NO: 293),
 VMWFFKQKEKEDQVLSYINGVTTSKPGVSLVYSMP (SEQ ID NO: 294),
 SRNLSLRLEGLQEKDSGPYSCSVNVQNKQGKSRGH (SEQ ID NO: 295),
 30 SIKTLELNVLVPPAPPSCRLQGVPHVGANVTLSQC (SEQ ID NO: 296),
 SPRSKPAVQYQWDRQLPSFQTFAPALDVIRGSLS (SEQ ID NO: 297),
 LTNLSSSMAGVYVCKAHNEVGTAQCNVTLEVSTGP (SEQ ID NO: 298),

GAAVVAGAVVGTLVGLGLLAGLVLLYHRRGKALEE (SEQ ID NO: 299),
PANDIKEDAIAPRTLWPWKSSDTISKNGTLSSVTS (SEQ ID NO: 300),
ARALRPPHGP RP GALTP T PSLSSQALPSPRLPTT (SEQ ID NO: 301), and/or
DGAHPQPISIPGGVSSSGLSRMGAVPVMVPAQSQAGSL (SEQ ID NO: 302).

- 5 Polynucleotides encoding these polypeptides are also provided.

This gene is expressed in various tissues including placenta, brain, heart, muscle, adipocytes, and liver.

- Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions: viral diseases, and immune diseases and/or disorders. Similarly, polypeptides and antibodies directed to those polypeptides are useful to provide immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system and central nervous system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., CNS, reproductive, vascular, cancerous and wounded tissues) or bodily fluids (e.g., lymph, amniotic fluid, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

- The tissue distribution in various tissues including placenta, brain, heart, muscle, adipocytes, and liver, and the homology to A33 antigen indicates that the protein product of this gene is useful for the diagnosis and/or treatment of a variety of cancers, most notably cancers of the immune system, as well as viral infections. Expression of this gene product suggests that this gene may be a player in the progression of these diseases, and may be a beneficial target for inhibitors as therapeutics. Representative uses are described in the "Chemotaxis" and "Binding Activity" sections below, in Examples 11, 12, 13, 14, 15, 16, 18, 19, and 20, and elsewhere herein. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional

supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:39 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1918 of SEQ ID NO:39, b is an integer of 15 to 1932, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:39, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 30

Preferred polypeptides of the invention comprise the following amino acid sequence: GSSFVVSEGSYLDISDWLNPAKLSLYY (SEQ ID NO: 303), LDISDWLNPAKL (SEQ ID NO: 304), SDWLNPAKLSL (SEQ ID NO: 305), and/or DACEQLCDPETGE (SEQ ID NO: 310). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in human ovary and adrenal gland tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, reproductive diseases and/or disorders, particularly ovarian cancer.

Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the reproductive system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., reproductive, and cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e.,

the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in ovary tissue suggests that polynucleotides and polypeptides corresponding to this gene are useful for diagnosing and/or treating reproductive system disorders including ovarian cancer, as well as cancers of other tissues where expression has been observed. Representative uses are described in the “Hyperproliferative Disorders” and “Regeneration” sections below and elsewhere herein. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:40 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1416 of SEQ ID NO:40, b is an integer of 15 to 1430, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:40, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 31

This gene is expressed primarily in thymus and stromal cells.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, aberrant immune responses, such as either chronic or acute inflammation. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above

tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample
5 taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in thymus stromal cells suggests that polynucleotides and polypeptides corresponding to this gene are useful for diagnosing and/or treating
10 disorders of the immune system, particularly those involving a pathological inflammatory response. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Furthermore, the gene product may also be involved in lymphopoiesis, therefore, it can be used in immune disorders such as infection,
15 inflammation, allergy, immunodeficiency etc. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify
20 agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are
25 related to SEQ ID NO:41 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general
30 formula of a-b, where a is any integer between 1 to 1393 of SEQ ID NO:41, b is an integer of 15 to 1407, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:41, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 32

Preferred polypeptides of the invention comprise the following amino acid sequence: EGKIKICEKKAIKVILHTCNS (SEQ ID NO: 311). Polynucleotides
5 encoding these polypeptides are also provided.

This gene is expressed primarily in frontal cortex.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are
10 not limited to, central nervous system (CNS) diseases and/or disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the CNS, expression of this gene at significantly higher or lower levels may be routinely
15 detected in certain tissues or cell types (e.g., brain, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid or cerebrospinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

20 Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 142 as residues: Pro-41 to Asp-47.

The tissue distribution in frontal cortex indicates that the protein products of this gene are useful for detection, treatment, and/or prevention of CNS disorders including disorders of the brain and nervous system. Representative uses are
25 described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Elevated expression of this gene product within the frontal cortex of the brain suggests that it may be involved in neuronal survival, synapse formation, conductance, neural differentiation, etc. Such involvement may impact many processes, such as learning and cognition. It may also
30 be useful in the treatment of such neurodegenerative disorders as schizophrenia, ALS, or Alzheimer's. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors,

to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly
5 available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:42 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or
10 more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 936 of SEQ ID NO:42, b is an integer of 15 to 950, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:42, and where b is greater than or equal to a + 14.

15 **FEATURES OF PROTEIN ENCODED BY GENE NO: 33**

This gene is expressed primarily in adipose tissue.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are
20 not limited to, obesity, Nasu-Hakola disease, cardiovascular disease, non-insulin-dependent diabetes mellitus. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the adipose, expression of this gene at significantly
25 higher or lower levels may be routinely detected in certain tissues or cell types (e.g., adipose, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the
30 disorder.

The tissue distribution in adipose suggests that the protein product of this gene is useful for the treatment and diagnosis of metabolic disorders related to lipids and

adipose tissue, such as obesity, Nasu-Hakola disease (membranous lipodystrophy), cardiovascular disease, lipidemia, non-insulin-dependent diabetes mellitus, stroke and carcinoma. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:43 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 990 of SEQ ID NO:43, b is an integer of 15 to 1004, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:43, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 34

Preferred polypeptides of the invention comprise the following amino acid sequence: NSARVEFFIPPLRITQKVRSTKS (SEQ ID NO: 312). Polynucleotides encoding these polypeptides are also encompassed by the invention.

This gene is apparently expressed exclusively in IL-1- and LPS-induced neutrophils.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, abnormal immune reactions or disorders including, but not limited to, chronic or cyclic neutropenia, neutrophilia, and neutrocytosis. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression

of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard
5 gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in neutrophils suggests that the protein product of this gene is useful for detection, treatment, and/or prevention of immune disorders or abnormal reactions mediated by neutrophils, including infection, inflammation,
10 allergy, immunodeficiency, chronic or cyclic neutropenia, neutrophilia, and neutrocytosis, and the like. Moreover, the expression of this gene product suggests a role in regulating the proliferation, survival, differentiation, and/or activation of hematopoietic cell lineages, including blood stem cells. This gene product may be involved in the regulation of cytokine production, antigen presentation, or other
15 processes that may also suggest a usefulness in the treatment of cancer (e.g., by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the natural gene product may be involved in immune functions. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immunodeficiency
20 diseases such as AIDS, leukemia, rheumatoid arthritis, granulomatous disease, inflammatory bowel disease, sepsis, acne, neutropenia, neutrophilia, psoriasis, hypersensitivities, such as T-cell mediated cytotoxicity, immune reactions to transplanted organs and tissues, such as host-versus-graft and graft-versus-host diseases, or autoimmunity disorders, such as autoimmune infertility, lense tissue
25 injury, demyelination, systemic lupus erythematosus, drug induced hemolytic anemia, rheumatoid arthritis, Sjogren's disease, scleroderma and tissues. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Protein, as well as, antibodies directed against the protein may
30 show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:44 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1667 of SEQ ID NO:44, b is an integer of 15 to 1681, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:44, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 35

The translated ORF of the contig has homology with the human, porcine, and bovine INS10 double-chain insulin precursor, especially around a region containing multiple cysteine residues.

Preferred polypeptides of the invention comprise the following amino acid sequence:

MMVWNLFPFCFPPLLLLQFIDCQQSSEIEQGFRSLLGHPIFFCPDPCWQSCMN
CVILSVLSFFFLIRWISKIVAVQKLESSSRKPKILFLIISCEIASFIHLFLSQMSAEC
CCFYLVLICKY (SEQ ID NO: 313), MMVWNLFPFCFPPLLLLQFIDCQQSSEIE
(SEQ ID NO: 314), QGFRSLLGHPIFFCPDPCWQSCMNCVI (SEQ ID NO: 315),
LSVLSFFFLIRWISKIVAVQKLESSSRKPKILFLI (SEQ ID NO: 316), and/or
ISCEIASFIHLFLSQMSAECCCFYLVLICKY (SEQ ID NO: 317). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in cells and tissues isolated from a 15 days post-incision healing abdomen wound and, to a lesser extent, in many connective tissues/cells with proliferative capacity, such as osteoclastoma, ovarian cancer, B-cell lymphoma and hepatocellular tumor.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, wound healing, diabetes mellitus, and cancers of the bone and

connective tissues, lymphomas, and cancers of the liver. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly those of the cells and tissues involved in healing tissue damages and regeneration, diabetes mellitus, and many cancers including, but not limited to ovarian cancer, breast cancer, colon cancer, cardiac tumors, pancreatic cancer, melanoma, retinoblastoma, glioblastoma, lung cancer, intestinal cancer, testicular cancer, stomach cancer, neuroblastoma, myxoma, myoma, lymphoma, endothelioma, osteoblastoma, osteoclastoma, osteosarcoma, chondrosarcoma, adenoma, and the like, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 145 as residues: Gln-22 to Phe-31.

The tissue distribution in healing wound and regenerating tissues/cells suggests that the protein product of this gene is useful for detection, treatment, and/or prevention of tissue damages, trauma, necrosis, and tissue regeneration. In addition, since this gene exhibits homology with an insulin precursor, it can be used to regulate the metabolism of glucose or other sugars, the synthesis of proteins, and the formation and storage of neutral lipids.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:45 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1351 of SEQ ID NO:45, b is an

integer of 15 to 1365, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:45, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 36

- 5 Preferred polypeptides of the invention comprise the following amino acid sequence:
 KVDTPRRHFCPEISFFLTPLPQSARNSTVRNALSGLKNLTPAMISTVSKQDTSK
 LGEEE (SEQ ID NO: 318). Polynucleotides encoding these polypeptides are also provided.
- 10 When tested against U937 Myeloid cell lines, supernatants removed from cells containing this gene activated the GAS assay. Thus, it is likely that this gene activates myeloid cells through the Jak-STAT signal transduction pathway. The gamma activating sequence (GAS) is a promoter element found upstream of many genes which are involved in the Jak-STAT pathway. The Jak-STAT pathway is a large,
- 15 signal transduction pathway involved in the differentiation and proliferation of cells. Therefore, activation of the Jak-STAT pathway, reflected by the binding of the GAS element, can be used to indicate proteins involved in the proliferation and differentiation of cells.
- This gene is expressed primarily in B-cell lymphoma.
- 20 Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, B-cell lymphoma, immunodeficient or auto-immune conditions. Similarly, polypeptides and antibodies directed to these polypeptides are useful in
- 25 providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal
- 30 fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution suggests that the protein product of this gene is useful for the detection, treatment, and/or prevention of B-cell lymphomas, as well as other immune disorders including: leukemias, auto-immunities, immunodeficiencies (e.g., AIDS), immuno-suppressive conditions (transplantation) and hematopoietic disorders, such as anemia, pancytopenia, leukopenia, thrombocytopenia or leukemia, since stromal cells are important in the production of cells of hematopoietic lineages. In addition, this gene product may be applicable in conditions of general microbial infection, inflammation or cancer. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. The uses include bone marrow cell ex vivo culture, bone marrow transplantation, bone marrow reconstitution, radiotherapy or chemotherapy of neoplasia. The gene product may also be involved in lymphopoiesis, therefore, it can be used in immune disorders such as infection, inflammation, allergy, immunodeficiency etc. In addition, the biological activity of supernatants from cells expressing this gene in the GAS assay indicates that this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:46 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1123 of SEQ ID NO:46, b is an integer of 15 to 1137, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:46, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 37

The gene encoding the disclosed cDNA is thought to reside on chromosome 10. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 10.

5 This gene is expressed primarily in infant brain and caudate nucleus tissues, and, to a lesser extent, in various other normal and transformed cell types, including smooth muscle and adult heart tissues, and T-cell lymphoma.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, neurological and growth defects. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the developing nervous system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., neural, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

20 The tissue distribution in infant brain tissue suggests that polynucleotides and polypeptides corresponding to this gene are useful for the study, detection and/or treatment of infant and general nervous system disorders and neoplasias. The tissue distribution indicates polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of neurodegenerative disease states, behavioral disorders, or inflammatory conditions. Representative uses are described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Briefly, the uses include, but are not limited to the detection, treatment, and/or prevention of Alzheimer's Disease, Parkinson's Disease, Huntington's Disease, Tourette Syndrome, meningitis, 25 encephalitis, demyelinating diseases, peripheral neuropathies, neoplasia, trauma, congenital malformations, spinal cord injuries, ischemia and infarction, aneurysms, hemorrhages, schizophrenia, mania, dementia, paranoia, obsessive compulsive

disorder, depression, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception.

5 In addition, elevated expression of this gene product in regions of the brain indicates it plays a role in normal neural function. Potentially, this gene product is involved in synapse formation, neurotransmission, learning, cognition, homeostasis, or neuronal differentiation or survival. In addition, the gene or gene product may also play a role in the treatment and/or detection of developmental disorders associated with the developing embryo, or sexually-linked disorders. Furthermore, the protein 10 may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

15 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:47 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is 20 cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 2749 of SEQ ID NO:47, b is an integer of 15 to 2763, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:47, and where b is greater than or equal to a + 14.

25

FEATURES OF PROTEIN ENCODED BY GENE NO: 38

The translation product of this gene shares weak homology with O-linked GlcNAc transferases (See, e.g., Genbank Acc. No. gil2266994) which are important for a variety of cellular functions, including, secreted protein stability and proper 30 function.

Preferred polypeptides of the invention comprise the following amino acid sequence: LLLCPWWLCFDWS (SEQ ID NO: 319),

MGCIPLIKSISDWRVIALAALWFCLIGLICQALCEDGHKRRILTLGLGFLVIPF
 LPASNLFFRVGFVVAECVLYLPSIGYCVLLTFGFGALSKHTKKKKLIAAVVLG
 ILFINTLRCVLRRTAKWRSEEQLFRSALSVCPLNAKVHYNIGKNLADKGNQTA
 AIRYYREAVRLNPKYVHAMNNLGNILKERNELQAEELLSLAVQIQPDFAAA
 5 WMNLGIVQNSLKRFEAEQNYRTAIKHRRKYPDCYYNLGRLVRTGCPVPVE
 GKMGYFS (SEQ ID NO: 320),
 MGCIPLIKSISDWRVIALAALWFCLIGLICQALCEDG (SEQ ID NO: 321),
 HKRRILTLGLGFLVIPFLPASNLFFRVGFVVAECVLYL (SEQ ID NO: 322),
 PSIGYCVLLTFGFGALSKHTKKKKLIAAVVLGILFINT (SEQ ID NO: 323),
 10 LRCVLRRTAKWRSEEQLFRSALSVCPLNAKVHYNIGKNL (SEQ ID NO: 325),
 ADKGNQTAIRYYREAVRLNPKYVHAMNNLGNILKERN (SEQ ID NO: 326),
 ELQAEELLSLAVQIQPDFAAAWMNLGIVQNSLKRFE (SEQ ID NO: 327),
 and/or AEQNYRTAIKHRRKYPDCYYNLGRLVRTGCPVPVEGKMGYFS (SEQ
 ID NO: 328). Polynucleotides encoding these polypeptides are also provided.

15 This gene is expressed primarily in substantia nigra and, to a lesser extent, in
 amygdala and brain, striatum.

Therefore, polynucleotides and polypeptides of the invention are useful as
 reagents for differential identification of the tissue(s) or cell type(s) present in a
 biological sample and for diagnosis of diseases and conditions which include, but are
 20 not limited to, neurodegenerative disorders. Similarly, polypeptides and antibodies
 directed to these polypeptides are useful in providing immunological probes for
 differential identification of the tissue(s) or cell type(s). For a number of disorders of
 the above tissues or cells, particularly of the central nervous system and brain,
 expression of this gene at significantly higher or lower levels may be routinely
 25 detected in certain tissues or cell types (e.g., CNS, cancerous and wounded tissues) or
 bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or
 another tissue or cell sample taken from an individual having such a disorder, relative
 to the standard gene expression level, i.e., the expression level in healthy tissue or
 bodily fluid from an individual not having the disorder.

30 Preferred epitopes include those comprising a sequence shown in SEQ ID NO:
 148 as residues: Ser-35 to Arg-41.

The tissue distribution in substantia nigra and, to a lesser extent, in amygdala and brain, striatum, suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of neurodegenerative disease states, behavioral disorders, or inflammatory conditions.

5 Representative uses are described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Briefly, the uses include, but are not limited to the detection, treatment, and/or prevention of Alzheimer's Disease, Parkinson's Disease, Huntington's Disease, Tourette Syndrome, meningitis, encephalitis, demyelinating diseases, peripheral neuropathies, neoplasia,
10 trauma, congenital malformations, spinal cord injuries, ischemia and infarction, aneurysms, hemorrhages, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, depression, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception.

15 In addition, elevated expression of this gene product in regions of the brain indicates it plays a role in normal neural function. Potentially, this gene product is involved in synapse formation, neurotransmission, learning, cognition, homeostasis, or neuronal differentiation or survival. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate
20 ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly
25 available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:48 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or
30 more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1562 of SEQ ID NO:48, b is an

integer of 15 to 1576, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:48, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 39

5 This gene is expressed primarily in epithelial-TNF α and INF induced cells and brain frontal cortex.

 Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are
10 not limited to, neurodegenerative diseases and/or disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the central nervous system, expression of this gene at significantly higher or lower levels may be routinely
15 detected in certain tissues or cell types (e.g., CNS, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

20 Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 149 as residues: Lys-35 to Asp-41, Glu-49 to Leu-63.

 The tissue distribution in the brain suggests that the protein product of this gene is useful for detection, treatment, and/or prevention of neurodegenerative disorders, especially those involving the frontal cortex. Representative uses are
25 described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Briefly, the elevated expression of this gene product within the frontal cortex of the brain suggests that it may be involved in neuronal survival; synapse formation; conductance; neural differentiation, etc. Such involvement may impact many processes, such as learning and cognition. It
30 may also be useful in the treatment of such neurodegenerative disorders as schizophrenia; ALS; or Alzheimer's. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate

ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

5 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:49 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is
10 cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1334 of SEQ ID NO:49, b is an integer of 15 to 1348, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:49, and where b is greater than or equal to a + 14.

15

FEATURES OF PROTEIN ENCODED BY GENE NO: 40

Preferred polypeptides of the invention comprise the following amino acid sequence: PTRPPTRPLSFTFTKQTSSTCLSLHF (SEQ ID NO: 329).

Polynucleotides encoding these polypeptides are also provided.

20 The gene encoding the disclosed cDNA is believed to reside on chromosome 18. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 18.

This gene is expressed primarily in infant brain, frontal cortex, and, to a lesser extent, in melanocytes.

25 Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, neurodegenerative diseases and/or disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological
30 probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the central nervous system, expression of this gene at significantly higher or lower levels may be routinely

detected in certain tissues or cell types (e.g., CNS, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or
5 bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 150 as residues: Val-40 to Cys-47, Lys-49 to Gly-54.

The tissue distribution suggests that the protein product of this gene is useful for the detection, treatment, and/or prevention of neurodegenerative disorders especially those involving the frontal cortex. Moreover, polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of neurodegenerative disease states, behavioral disorders, or inflammatory conditions. Representative uses are described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and
10 elsewhere herein. Briefly, the uses include, but are not limited to the detection, treatment, and/or prevention of Alzheimer's Disease, Parkinson's Disease, Huntington's Disease, Tourette Syndrome, meningitis, encephalitis, demyelinating diseases, peripheral neuropathies, neoplasia, trauma, congenital malformations, spinal cord injuries, ischemia and infarction, aneurysms, hemorrhages, schizophrenia,
15 mania, dementia, paranoia, obsessive compulsive disorder, depression, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception.

In addition, elevated expression of this gene product in regions of the brain indicates it plays a role in normal neural function. Potentially, this gene product is
25 involved in synapse formation, neurotransmission, learning, cognition, homeostasis, or neuronal differentiation or survival. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the
30 protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:50 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1250 of SEQ ID NO:50, b is an integer of 15 to 1264, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:50, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 41

This gene shows structural homology with the duck insulin precursor which is thought to be important in metabolic homeostasis (See Accession No. pirlA01600IIPDK insulin precursor). Preferred polypeptide fragments comprise the amino acid sequence:
 LECVLLICFRAMSAIYTHTSIGNAQKLFTDGSAFRRVREPLPKEGKSWPQ
 (SEQ ID NO: 330). Also preferred are polynucleotide fragments encoding this polypeptide fragment.

This gene is expressed primarily in eosinophil-IL5 induced cells, and, to a lesser extent, in B cell lymphoma, breast lymph node, and CD34 depleted buffy coat (cord blood).

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, immune diseases and/or disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, hematopoietic, and cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal

fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO:

5 151 as residues: Arg-39 to Glu-56.

The tissue distribution in hematopoietic tissues suggests that the protein product of this gene is useful for detection, treatment, and/or prevention of immune disorders especially those involving eosinophils and B-cells. The protein product of this gene is useful for the detection, treatment, and/or prevention of a variety of
10 immune system disorders. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, the expression of this gene product indicates a role in regulating the proliferation; survival; differentiation; and/or activation of hematopoietic cell lineages, including blood stem cells. This gene
15 product may be involved in the regulation of cytokine production, antigen presentation, or other processes suggesting a usefulness in the treatment of cancer (e.g. by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the natural gene product may be involved in immune functions. Therefore it may be also used as an
20 agent for immunological disorders including arthritis, asthma, immunodeficiency diseases such as AIDS, leukemia, rheumatoid arthritis, granulomatous disease, inflammatory bowel disease, sepsis, acne, neutropenia, neutrophilia, psoriasis, hypersensitivities, such as T-cell mediated cytotoxicity; immune reactions to transplanted organs and tissues, such as host-versus-graft and graft-versus-host
25 diseases, or autoimmunity disorders, such as autoimmune infertility, lense tissue injury, demyelination, systemic lupus erythematosus, drug induced hemolytic anemia, rheumatoid arthritis, Sjogren's disease, scleroderma and tissues. Moreover, the protein may represent a secreted factor that influences the differentiation or behavior of other blood cells, or that recruits hematopoietic cells to sites of injury. In addition, this gene
30 product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological

activity, raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

5 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:51 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is
10 cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1646 of SEQ ID NO:51, b is an integer of 15 to 1660, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:51, and where b is greater than or equal to a + 14.

15

FEATURES OF PROTEIN ENCODED BY GENE NO: 42

Preferred polypeptides of the invention comprise the following amino acid sequence: KQNLTNLDVPVQYHVALSDKVK (SEQ ID NO: 331). Polynucleotides encoding these polypeptides are also provided.

20 This gene is expressed primarily in pineal gland and, to a lesser extent, in multiple sclerosis cells.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are
25 not limited to, insomnia, multiple sclerosis, and other neurodegenerative diseases and/or disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the central nervous system and endocrine system,
30 expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., CNS, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or

another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO:

5 152 as residues: Pro-7 to Gly-12.

The tissue distribution primarily in pineal gland and, to a lesser extent, in multiple sclerosis cells suggests that the protein product of this gene is useful for treatment of insomnia and jet lag through agonist or antagonist interaction with pineal gland receptors to allow regulation of melatonin production. Representative uses are described elsewhere herein. This gene may also be useful in the treatment of multiple sclerosis. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:52 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1664 of SEQ ID NO:52, b is an integer of 15 to 1678, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:52, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 43

The gene encoding the disclosed cDNA is believed to reside on chromosome 2. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 2.

Preferred polypeptides of the invention comprise the following amino acid sequence:

PSCPPMKKELPVDSCLPRLSLELHPQKMDPKRQHIQLLSSLTECLTVDPPLSASV
 WRQLYPKHLSQSSLLL
 XHLLSSWEQIPKKVQKSLQETIQSLKLTNQELLRKGSSNNQDVVTCD (SEQ ID
 NO: 332). Also preferred are the polynucleotides encoding these polypeptides.

5 This gene is expressed primarily in ovary tumors and breast cancer and, to a lesser extent, in normal lung and colon tumors.

 Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are
 10 not limited to, cancer, particularly of the ovary and breast; and colon. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the colon, breast, or female reproductive system, expression of this gene at significantly
 15 higher or lower levels may be routinely detected in certain tissues or cell types (e.g., reproductive, gastrointestinal, and cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from
 20 an individual not having the disorder.

 The tissue distribution primarily in ovary tumors and breast cancer and, to a lesser extent, in normal lung and colon tumors indicates that the protein product of this gene is useful for the diagnosis and/or treatment of a variety of cancers, most notably cancers of the ovary, breast, or colon. Representative uses are described in the
 25 “Hyperproliferative Disorders” and “Regeneration” sections below and elsewhere herein. Briefly, the expression of this gene product in a variety of cancers suggests that it may be a player in the progression of the disease, and may be a beneficial target for inhibitors as therapeutics. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or
 30 receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may

show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:53 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1846 of SEQ ID NO:53, b is an integer of 15 to 1860, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:53, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 44

In an alternative reading frame, this gene shares sequence homology with a murine testosterone induced transcript (See Geneseq Accession No. 758299). This same region also shares sequence homology with a human cancer suppressor transfer factor protein (See Geneseq Accession No. R86875). The gene encoding the disclosed cDNA is thought to reside on chromosome 11. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 11.

Preferred polypeptides of the invention comprise the following amino acid sequence:

KAPYSWLADSWPHPSRSPSAQEPRGSCCPSNPDPDDRYNEAGISLYLAQTA
RGTAAPGEGPVYSTIDPAGEELQTFHGGFPQHPSGDLGPWSQYAPPEWSQG

(SEQ ID NO: 333). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in various embryonic/fetal tissues, particularly fetal brain tissue.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, congenital birth defects, particularly of the central nervous system, and cancers, such as MEN. Similarly, polypeptides and antibodies directed to these

polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the central nervous system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., neural, developing, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

10 The tissue distribution in fetal and embryonic tissues suggests that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and/or treatment of a variety of cancers, most notably cancers of the central nervous system, such as MEN, as well as the disorders of the central nervous system listed above. Representative uses are described in the "Hyperproliferative Disorders" and "Regeneration" sections below and elsewhere herein. Briefly, the expression within embryonic tissue and other cellular sources marked by proliferating cells suggests that this protein may play a role in the regulation of cellular division, and may show utility in the detection, treatment, and/or prevention of cancer and other proliferative disorders. Similarly, embryonic development also involves decisions involving cell differentiation and/or apoptosis in pattern formation. Thus, this protein may also be involved in apoptosis or tissue differentiation and could again be useful in cancer therapy. Expression of this gene product in a variety of systems suggests that this gene may be a player in the progression of these diseases, and may be a beneficial target for inhibitors as therapeutics. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

30 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:54 and may have been publicly available prior to conception of

the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general
5 formula of a-b, where a is any integer between 1 to 1649 of SEQ ID NO:54, b is an integer of 15 to 1663, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:54, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 45

10 The gene encoding the disclosed cDNA is thought to reside on chromosome 1. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 1. This gene is highly homologous to bovine cytochrome b-5 reductase (See e.g., GENBANK: locus BOVCYB5R, accession M83104; Strittmatter et al., J. Biol. Chem. 267:2519-2523 (1992); the references
15 available through the accession number and the captioned reference are hereby incorporated herein by reference). Based on this homology, it is likely that this gene would have activity similar to NADH-cytochrome b5 reductase.

This gene is expressed primarily in liver and lung tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as
20 reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, diseases and/or disorders of the liver and lung including chronic liver failure, bronchitis, emphysema, and chronic lung failure. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes
25 for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the hepatic and pulmonary systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., hepatic, pulmonary, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid
30 and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 155 as residues: Arg-31 to Gln-37, Val-88 to Gly-95, Pro-110 to Gln-120, Gln-151 to Ala-163, Asp-231 to Trp-237, Pro-277 to Lys-287.

The tissue distribution in liver tissue suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection and treatment of liver disorders and cancers (e.g. hepatoblastoma, jaundice, hepatitis, liver metabolic diseases and conditions that are attributable to the differentiation of hepatocyte progenitor cells). Representative uses are described in the "Hyperproliferative Disorders", "Infectious Disease", and "Binding Activity" sections below, in Example 11, and 27, and elsewhere herein. Alternatively, the tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection and treatment of disorders associated with developing lungs, particularly in premature infants where the lungs are the last tissues to develop. The tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and intervention of lung tumors, since the gene may be involved in the regulation of cell division, particularly since it is expressed in fetal tissue. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:55 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1618 of SEQ ID NO:55, b is an integer of 15 to 1632, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:55, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 46

This gene is expressed primarily in tonsil tissue and neutrophils, and, to a lesser extent, in testes tissue, brain and cerebellum tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as
5 reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, diseases and/or disorders of the tonsils, immune system disorders, reproductive disorders, and neural disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for
10 differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the tonsils, and the immune, reproductive, and neural systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, neural, reproductive, tonsils, cancerous and wounded tissues) or bodily fluids (e.g., lymph,
15 serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO:
20 156 as residues: Pro-17 to Glu-26, Asp-60 to Val-72.

The tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of a variety of immune system disorders. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14,
25 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, the expression of this gene product in tonsils as well as neutrophils suggests a role in the regulation of the proliferation; survival; differentiation; and/or activation of potentially all hematopoietic cell lineages, including blood stem cells. This gene product may be involved in the regulation of cytokine production, antigen presentation, or other
30 processes that may also suggest a usefulness in the treatment of cancer (e.g. by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the gene or protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Alternatively, the tissue distribution indicates that polynucleotides and polypeptides corresponding to this gene are useful for the treatment and/or diagnosis of conditions concerning proper testicular function (e.g. endocrine function, sperm maturation), as well as cancer. Therefore, this gene product is useful in the treatment of male infertility and/or impotence. This gene product is also useful in assays designed to identify binding agents, as such agents (antagonists) are useful as male contraceptive agents. Similarly, the protein is believed to be useful in the treatment and/or diagnosis of testicular cancer. The testes are also a site of active gene expression of transcripts that may be expressed, particularly at low levels, in other tissues of the body. Therefore, this gene product may be expressed in other specific tissues or organs where it may play related functional roles in other processes, such as hematopoiesis, inflammation, bone formation, and kidney function, to name a few possible target indications.

The tissue distribution in brain and cerebellum tissues suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection/treatment of neurodegenerative disease states and behavioural disorders such as Alzheimers Disease, Parkinsons Disease, Huntingtons Disease, Tourette Syndrome, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception. In addition, the gene or gene product may also play a role in the treatment and/or detection of developmental disorders associated with the developing embryo, or sexually-linked disorders. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to

identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly
5 available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:56 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or
10 more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 2219 of SEQ ID NO:56, b is an integer of 15 to 2233, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:56, and where b is greater than or equal to a + 14.

15 **FEATURES OF PROTEIN ENCODED BY GENE NO: 47**

The translation product of this gene shares sequence homology with seven trans-membrane receptors and plectin, which is thought to be important in muscular dystrophy and multiple other diseases. The gene encoding the disclosed cDNA is thought to reside on chromosome 16. Accordingly, polynucleotides related to this
20 invention are useful as a marker in linkage analysis for chromosome 16.

This gene is expressed primarily in brain, fetal organs and placental tissue, and, to a lesser extent, in several other organs and tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a
25 biological sample and for diagnosis of diseases and conditions which include, but are not limited to, diseases and/or disorders of the central nervous system, fetal and developing organs. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above
30 tissues or cells, particularly of the central nervous system, developing and fetal systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., neural, developing, cancerous

and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

5 Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 157 as residues: Arg-13 to Trp-19, Leu-76 to Ala-92, Ser-100 to Arg-105.

The tissue distribution and homology to plectin and seven transmembrane receptors suggests that polynucleotides and polypeptides corresponding to this gene are useful for the treatment and/or diagnosis of disorders of the central nervous
10 system, as well as developing and fetal systems. Moreover, the expression within fetal tissue indicates this protein may play a role in the regulation of cellular division, and may show utility in the diagnosis, treatment, and/or prevention of developmental diseases and disorders, cancer, and other proliferative conditions.

Representative uses are described in the "Hyperproliferative Disorders" and
15 "Regeneration" sections below and elsewhere herein. Briefly, developmental tissues rely on decisions involving cell differentiation and/or apoptosis in pattern formation. Dysregulation of apoptosis can result in inappropriate suppression of cell death, as occurs in the development of some cancers, or in failure to control the extent of cell death, as is believed to occur in acquired immunodeficiency and certain
20 neurodegenerative disorders, such as spinal muscular atrophy (SMA). Because of potential roles in proliferation and differentiation, this gene product may have applications in the adult for tissue regeneration and the treatment of cancers. It may also act as a morphogen to control cell and tissue type specification. Therefore, the polynucleotides and polypeptides of the present invention are useful in treating,
25 detecting, and/or preventing said disorders and conditions, in addition to other types of degenerative conditions. Thus this protein may modulate apoptosis or tissue differentiation and would be useful in the detection, treatment, and/or prevention of degenerative or proliferative conditions and diseases. The protein is useful in modulating the immune response to aberrant polypeptides, as may exist in
30 proliferating and cancerous cells and tissues. The protein can also be used to gain new insight into the regulation of cellular growth and proliferation. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue

markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

5 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:57 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is
10 cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1949 of SEQ ID NO:57, b is an integer of 15 to 1963, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:57, and where b is greater than or equal to a + 14.

15

FEATURES OF PROTEIN ENCODED BY GENE NO: 48

Preferred polypeptides of the invention comprise the following amino acid sequence: LQQTMQAMLHFGGRLAQSLRGTSKEAASDPSDSPNLPTPGSWW (SEQ ID NO: 334),
20 EQLTQASRVYASGGTEGFPLSRWAPGRHGTAEEGAQERPLPTDE (SEQ ID NO: 335), MAPGRGLWLGRFLFGVPGGPAENENGALKSRRPSSWLPPTVSVLAL (SEQ ID NO: 336),
VKRGAPPEMPSPQELEASAPRMVQTHRAVRALCDHTAARPDQLS (SEQ ID NO: 337), FRRGEVLRVITTVDEDWLRRCGRDGMGLVPVGYTSLVL (SEQ ID
25 NO: 338), and/or
LQQTMQAMLHFGGRLAQSLRGTSKEAASDPSDSPNLPTPGSWWEQLTQASRVYASGGTEGFPLSRWAPGRHGTAEEGAQERPLPTDEMAPGRGLWLGRFLFGVPGGPAENENGALKSRRPSSWLPPTVSVLALVKRGAPPEMPSPQELEASAPRMVQTHRAVRALCDHTAARPDQLSFRRGEVLRVITTVDEDWLRRCGRDGMGLVPVGYTSLVL (SEQ ID NO: 339). Polynucleotides encoding these polypeptides
30 are also provided.

This gene is expressed primarily in synovium, synovial sarcoma, and chondrosarcoma tissues, and, to a lesser extent, in endometrial stromal cells.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, skeletal and reproductive disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the skeletal and reproductive systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., skeletal, reproductive, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in skeletal tissues suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection and/or treatment of disorders and conditions affecting the skeletal system, in particular osteoporosis as well as disorders afflicting connective tissues (e.g., arthritis, trauma, tendonitis, chondromalacia and inflammation). The protein product is useful in the diagnosis or treatment of various autoimmune disorders such as rheumatoid arthritis, lupus, scleroderma, and dermatomyositis as well as dwarfism, spinal deformation, and specific joint abnormalities as well as chondrodysplasias (i.e., spondyloepiphyseal dysplasia congenita, familial arthritis, Atelosteogenesis type II, metaphyseal chondrodysplasia type Schmid). Alternatively, the tissue distribution in endometrium suggests that polynucleotides and polypeptides corresponding to this gene are useful for treating female infertility. The protein product is likely involved in preparation of the endometrium of implantation and could be administered either topically or orally.

Alternatively, this gene could be transfected in gene-replacement treatments into the cells of the endometrium and the protein products could be produced. Similarly, these treatments could be performed during artificial insemination for the purpose of increasing the likelihood of implantation and development of a healthy

embryo. In both cases this gene or its gene product could be administered at later stages of pregnancy to promote healthy development of the endometrium. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

5 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:58 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is
10 cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1253 of SEQ ID NO:58, b is an integer of 15 to 1267, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:58, and where b is greater than or equal to a + 14.

15

FEATURES OF PROTEIN ENCODED BY GENE NO: 49

Preferred polypeptides of the invention comprise the following amino acid sequence:

ARACPRXGAAVEKLGGKPVQPDSKPTCCSQVKAEGILIFAGLTGLKLLPSSLQ
20 RAVFVRQCLGFWNDGSRA LQ (SEQ ID NO: 340). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in hypothalamus and hepatocellular tumor and, to a lesser extent, in other tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as
25 reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, obesity, metabolic disorders, and hepatocellular tumors. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell
30 type(s). For a number of disorders of the above tissues or cells, particularly of the, endocrine system, hypothalamus and hepatocellular tumor, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell

types (e.g., hypothalamus, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in hypothalamus and hepatocellular tumors indicates that the protein products of this gene are useful for detection, treatment, and/or prevention of obesity, metabolic disorders, and hepatocellular tumors. Similarly, the tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of various endocrine disorders and cancers, particularly Addison's disease, Cushing's Syndrome, and disorders and/or cancers of the pancreas (e.g., diabetes mellitus), adrenal cortex, ovaries, pituitary (e.g., hyper-, hypopituitarism), thyroid (e.g., hyper-, hypothyroidism), parathyroid (e.g., hyper-, hypoparathyroidism), hypothalamus, and testes. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:59 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1281 of SEQ ID NO:59, b is an integer of 15 to 1295, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:59, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 50

Preferred polypeptides of the invention comprise the following amino acid sequence: FQSVYHMKLQSSNLPASVYGNNLNCINSSSS (SEQ ID NO: 341). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in brain, placenta and breast.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, reproductive, neurological and behavioural disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the CNS, immune and female reproductive systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., reproductive, CNS, cancerous and wounded tissues) or bodily fluids (e.g., lymph, breast milk, amniotic fluid, serum, plasma, urine, synovial fluid or cerebrospinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution of this gene in brain indicates that the protein products of this gene are useful for the detection/treatment of neurodegenerative disease states and behavioural disorders such as Alzheimer's Disease, Parkinson's Disease, Huntington's Disease, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder and panic disorder. In addition, expression in breast and placenta suggests a role in the detection and/or treatment of female infertility and/or pregnancy disorders. In addition, the gene or gene product may also play a role in the treatment and/or detection of developmental disorders associated with the developing embryo, or sexually-linked disorders. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:60 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general

formula of a-b, where a is any integer between 1 to 901 of SEQ ID NO:60, b is an integer of 15 to 915, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:60, and where b is greater than or equal to a + 14.

5 FEATURES OF PROTEIN ENCODED BY GENE NO: 51

This gene is expressed primarily in adipocytes.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, obesity, Nasu-Hakola disease, cardiovascular disease, non-insulin-dependent diabetes mellitus. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the adipose, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., endocrine, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 161 as residues: Asp-6 to Arg-12, Lys-31 to Leu-41.

The tissue distribution in adipose tissue suggests that the protein product of this gene is useful for the treatment and diagnosis of endocrine and metabolic disorders related to lipids and adipose tissue, such as obesity, Nasu-Hakola disease (membranous lipodystrophy), cardiovascular disease, lipidemia, non-insulin-dependent diabetes mellitus, stroke and carcinoma. Furthermore, the protein product of this gene may show utility in ameliorating conditions which occur secondary to aberrant fatty-acid metabolism (e.g., aberrant myelin sheath development), either directly or indirectly. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:61 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1431 of SEQ ID NO:61, b is an integer of 15 to 1445, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:61, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 52

The gene encoding the disclosed cDNA is thought to reside on chromosome 1. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 1.

This gene is expressed primarily in testes, endometrial tumor tissue, bone marrow and placenta tissue, and, to a lesser extent, in several other tissues and organs.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, reproductive diseases and disorders, cancers and hematopoietic disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the hematopoietic and reproductive system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, reproductive, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 162 as residues: Phe-32 to Gln-41, Gln-54 to Asn-68.

The tissue distribution in testes tissue and bone marrow suggests that polynucleotides and polypeptides corresponding to this gene are useful for the treatment and/or diagnosis of disorders of the hematopoietic and reproductive systems, and cancers thereof. The tissue distribution indicates that polynucleotides and polypeptides corresponding to this gene are useful for the treatment and diagnosis of conditions concerning proper testicular function (e.g., endocrine function, sperm maturation), as well as cancer. Therefore, this gene product is useful in the treatment of male infertility and/or impotence. This gene product is also useful in assays designed to identify binding agents, as such agents (antagonists) are useful as male contraceptive agents. Similarly, the protein is believed to be useful in the treatment and/or diagnosis of testicular cancer. The testes are also a site of active gene expression of transcripts that may be expressed, particularly at low levels, in other tissues of the body. Therefore, this gene product may be expressed in other specific tissues or organs where it may play related functional roles in other processes, such as hematopoiesis, inflammation, bone formation, and kidney function, to name a few possible target indications. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:62 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1086 of SEQ ID NO:62, b is an

integer of 15 to 1100, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:62, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 53

5 The translation product of this gene has homology with metallothionine proteins from several organisms.

 This gene is expressed primarily in ovarian cancer, tonsils, and B-cell lymphoma.

 Therefore, polynucleotides and polypeptides of the invention are useful as
10 reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, reproductive defects, and lymphoid and ovarian cancers. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell
15 type(s). For a number of disorders of the above tissues or cells, particularly of the immune and female reproductive systems, and of lymphoid and ovarian cancers, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, reproductive, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid
20 and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

 Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 163 as residues: Leu-39 to Ser-47.

25 The tissue distribution in ovarian cancer, tonsils, and B-cell lymphoma suggests that polynucleotides and polypeptides corresponding to this gene are useful for the study, detection and/or treatment of female reproductive disorders, gonadal and general lymphoid neoplasias, and cancers thereof. Expression of this gene product in tonsils suggests a role in the regulation of the proliferation; survival;
30 differentiation; and/or activation of potentially all hematopoietic cell lineages, including blood stem cells. This gene product may be involved in the regulation of

cytokine production, antigen presentation, or other processes that may also suggest a usefulness in the treatment of cancer (e.g., by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the gene or protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological activity, raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:63 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1485 of SEQ ID NO:63, b is an integer of 15 to 1499, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:63, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 54

This gene is expressed primarily in adult kidney and pulmonary tissues, as well as in osteoblasts.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are

not limited to, metabolic, endocrine and skeletal disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the endocrine, skeletal, metabolic and developmental systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., endocrine, skeletal, cancerous and wounded tissues) or bodily fluids (e.g., sputum, lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 164 as residues: Ala-35 to Gly-45, Pro-67 to Pro-73, Pro-91 to Ser-97, Thr-127 to Leu-139, Leu-143 to Asn-152, Ser-162 to Pro-167.

The tissue distribution in kidney tissue and osteoblasts suggests that polynucleotides and polypeptides corresponding to this gene are useful for the study, diagnosis and/or treatment of various endocrine and skeletal disorders. Furthermore, elevated levels of expression of this gene product in osteoblasts suggests that it may play a role in the survival, proliferation, and/or growth of osteoblasts. Therefore, it may be useful in influencing bone mass in such conditions as osteoporosis. Alternatively, the tissue distribution in kidney suggests that this gene or gene product is useful in the treatment and/or detection of kidney diseases including renal failure, nephritis, renal tubular acidosis, proteinuria, pyuria, edema, pyelonephritis, hydronephritis, nephrotic syndrome, crush syndrome, glomerulonephritis, hematuria, renal colic and kidney stones, in addition to Wilm's Tumor Disease, and congenital kidney abnormalities such as horseshoe kidney, polycystic kidney, and Falconi's syndrome. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:64 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 641 of SEQ ID NO:64, b is an integer of 15 to 655, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:64, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 55

This gene is expressed primarily in neutrophils and embryonic tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, immune system disorders and cancers, and developmental disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune and developing systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, developing, cancerous and wounded tissues) or bodily fluids (e.g., lymph, amniotic fluid, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 165 as residues: Gln-21 to Ala-33, Lys-48 to Pro-53.

The tissue distribution in neutrophils and embryonic tissues suggests that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis, study and/or treatment of various developmental and immune system

disorders and cancers thereof, as well as cancers of other tissues where expression of this gene has been observed. Furthermore, expression within embryonic tissue and other cellular sources marked by proliferating cells suggests that this protein may play a role in the regulation of cellular division, and may show utility in the detection, treatment, and/or prevention of cancer and other proliferative disorders. Similarly, embryonic development also involves decisions involving cell differentiation and/or apoptosis in pattern formation. Thus, this protein may also be involved in apoptosis or tissue differentiation and could again be useful in cancer therapy.

Alternatively, expression of this gene product in neutrophils also strongly suggests a role for this protein in immune function and immune surveillance. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:65 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1432 of SEQ ID NO:65, b is an integer of 15 to 1446, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:65, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 56

Preferred polypeptides of the invention comprise the following amino acid sequence: FDFIASLLKANRLSLQTCELLLAAALLPSERYKAISI (SEQ ID NO: 342). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in fetal liver, spleen and, to a lesser extent, in breast.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, immune and haemopoietic diseases and/or disorders, in addition to, fetal development. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the circulatory system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., hematopoietic, developmental, and cancerous and wounded tissues) or bodily fluids (e.g., lymph, amniotic fluid, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 166 as residues: Ile-50 to Ser-61, Pro-75 to Ser-104.

The tissue distribution in fetal liver and spleen suggests that the protein product of this gene is useful for detection, treatment, and/or prevention of haemopoietic disorders involving stem cell production and maturation. Similarly, polynucleotides and polypeptides corresponding to this gene are useful for the treatment and diagnosis of hematopoietic related disorders such as anemia, pancytopenia, leukopenia, thrombocytopenia or leukemia since stromal cells are important in the production of cells of hematopoietic lineages. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, the uses include bone marrow cell ex-vivo culture, bone marrow transplantation, bone marrow reconstitution, radiotherapy or chemotherapy of neoplasia.

The gene product may also be involved in lymphopoiesis, therefore, it can be used in immune disorders such as infection, inflammation, allergy, immunodeficiency etc. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may

also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or
5 immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:66 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically
10 excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 656 of SEQ ID NO:66, b is an integer of 15 to 670, where both a and b correspond to the positions of nucleotide
15 residues shown in SEQ ID NO:66, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 57

This gene is expressed primarily in adult pulmonary cells.

Therefore, polynucleotides and polypeptides of the invention are useful as
20 reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, emphysema and other pulmonary diseases and/or disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell
25 type(s). For a number of disorders of the above tissues or cells, particularly of the pulmonary system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., lung, cardiovascular, and cancerous and wounded tissues) or bodily fluids (e.g., lymph, sputum, pulmonary surfactant, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or
30 cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in adult pulmonary cells suggests that the protein product of this gene is useful for detection, treatment, and/or prevention of disorders of the pulmonary systems, especially emphysema, asthma, and other similar dysfunctions. Representative uses are described elsewhere herein. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:67 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1678 of SEQ ID NO:67, b is an integer of 15 to 1692, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:67, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 58

This gene is expressed primarily in hypothalamus (schizophrenic), and, to a lesser extent, in cerebellum.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, schizophrenia and hypothalamic diseases and/or diseases. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the central nervous system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., CNS, cancerous and

wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

5 The tissue distribution in hypothalamus (schizophrenic) and, to a lesser extent, in cerebellum suggests that the protein product of this gene is useful for detection, treatment, and/or prevention of neurological disorders, especially schizophrenia, neurodegenerative disease states, behavioral disorders, or inflammatory conditions. Representative uses are described in the "Regeneration" and "Hyperproliferative
10 Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Briefly, the uses include, but are not limited to the detection, treatment, and/or prevention of Alzheimer's Disease, Parkinson's Disease, Huntington's Disease, Tourette Syndrome, meningitis, encephalitis, demyelinating diseases, peripheral neuropathies, neoplasia, trauma, congenital malformations, spinal cord injuries, ischemia and infarction,
15 aneurysms, hemorrhages, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, depression, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception. In addition, elevated expression of this gene product in regions of the brain indicates it plays a role in normal neural function.

20 Potentially, this gene product is involved in synapse formation, neurotransmission, learning, cognition, homeostasis, or neuronal differentiation or survival. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional
25 supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:68 and may have been publicly available prior to conception of
30 the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or

more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 641 of SEQ ID NO:68, b is an integer of 15 to 655, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:68, and where b is greater than or equal to a + 14.

5

FEATURES OF PROTEIN ENCODED BY GENE NO: 59

This gene is expressed primarily in CD34 positive hematopoietic cells.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, hematopoietic diseases and/or disorders; impaired immune function; susceptibility to infections; lymphomas and leukemias. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., hematopoietic, immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in CD34 positive cells indicates that the protein product of this gene is useful for the diagnosis and/or treatment of a variety of hematopoietic disorders. Expression of this gene product particularly in CD34 positive cells suggests that it plays a role in the proliferation; survival; differentiation; and/or activation of early stem and committed progenitor cells within the hematopoietic system. Thus, this gene product may be useful in determining the numbers and proportions of different hematopoietic cell lineages both in vitro and in vivo. Additionally, the tissue distribution indicates polynucleotides and polypeptides corresponding to this gene are useful for the treatment and diagnosis of hematopoietic related disorders such as anemia, pancytopenia, leukopenia, thrombocytopenia or leukemia since stromal cells are important in the production of cells of hematopoietic lineages.

Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, the uses include bone marrow cell ex-vivo culture, bone marrow transplantation, bone marrow reconstitution, radiotherapy or chemotherapy of neoplasia. The gene product may also be involved in lymphopoiesis, therefore, it can be used in immune disorders such as infection, inflammation, allergy, immunodeficiency etc. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:69 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1604 of SEQ ID NO:69, b is an integer of 15 to 1618, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:69, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 60

Preferred polypeptides of the invention comprise the following amino acid sequence: IDLSFPSTNVSLEDNRNTTKPSVNVG (SEQ ID NO: 343).

Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in dermatofibrosarcoma protuberance and 12 week old early human embryos.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, dermatofibrosarcoma; cancer; abnormal cell proliferation; embryological/developmental defects; inhibition of apoptosis; and hematopoietic diseases and/or disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the skin and epithelium, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., integumentary, reproductive, developmental, and cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, amniotic fluid, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution indicates that the protein product of this gene is useful for the diagnosis and/or treatment of abnormal cellular proliferation, such as cancer. Expression of this gene in dermatofibrosarcoma and 12 week early stage embryos indicates that it is involved in cellular proliferation and/or a block in differentiation. It may drive cellular proliferation directly, or it may play a role in inhibiting apoptosis or interfering with differentiation events. Similarly, this gene is useful for the treatment, diagnosis, and/or prevention of various skin disorders. Representative uses are described in the "Biological Activity", "Hyperproliferative Disorders", "Infectious Disease", and "Regeneration" sections below, in Example 11, 19, and 20, and elsewhere herein. Briefly, the protein is useful in detecting, treating, and/or preventing congenital disorders (i.e. nevi, moles, freckles, Mongolian spots, hemangiomas, port-wine syndrome), integumentary tumors (i.e., keratoses, Bowen's disease, basal cell carcinoma, squamous cell carcinoma, malignant melanoma, Paget's disease, mycosis fungoides, and Kaposi's sarcoma), injuries and inflammation of the skin (i.e., wounds, rashes, prickly heat disorder, psoriasis, dermatitis), atherosclerosis, urticaria, eczema, photosensitivity, autoimmune disorders (i.e., lupus erythematosus, vitiligo, dermatomyositis, morphea, scleroderma, pemphigoid, and pemphigus),

keloids, striae, erythema, petechiae, purpura, and xanthelasma. In addition, such disorders may predispose increased susceptibility to viral and bacterial infections of the skin (i.e., cold sores, warts, chickenpox, molluscum contagiosum, herpes zoster, boils, cellulitis, erysipelas, impetigo, tinea, athlete's foot, and ringworm).

5 Moreover, the protein product of this gene may also be useful for the treatment or diagnosis of various connective tissue disorders (i.e., arthritis, trauma, tendonitis, chondromalacia and inflammation, etc.), autoimmune disorders (i.e., rheumatoid arthritis, lupus, scleroderma, dermatomyositis, etc.), dwarfism, spinal deformation, joint abnormalities, and chondrodysplasias (i.e., spondyloepiphyseal
10 dysplasia congenita, familial osteoarthritis, Atelosteogenesis type II, metaphyseal chondrodysplasia type Schmid). Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the
15 protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:70 and may have been publicly available prior to conception of
20 the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1788 of SEQ ID NO:70, b is an
25 integer of 15 to 1802, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:70, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 61

This gene is expressed primarily in neutrophils.

30 Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are

not limited to, disorders affecting the immune system. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system expression of this

5 gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue from an individual

10 not having the disorder.

The tissue distribution in neutrophils suggests that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and/or treatment of immune system disorders, especially those affecting neutrophils. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below,

15 in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, this gene product may be involved in the regulation of cytokine production, antigen presentation, or other processes that may also suggest a usefulness in the treatment of cancer (e.g. by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the gene or protein, as

20 well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have

25 commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional

30 supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:71 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1278 of SEQ ID NO:71, b is an integer of 15 to 1292, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:71, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 62

Preferred polypeptides of the invention comprise the following amino acid sequence: LNILISLTVSSHCKL (SEQ ID NO: 344), INYHSGFIHQFLA (SEQ ID NO: 345), and/or MANNSSLSSQFI (SEQ ID NO: 346). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in thymus tissue.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, diseases and/or disorders of the immune system. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 172 as residues: Pro-44 to Arg-50.

The tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of a variety of immune system disorders. Representative uses are described in the “Immune Activity” and “Infectious Disease” sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, the expression of this gene product in thymus suggests a role in the regulation of the proliferation; survival; differentiation; and/or activation of potentially all hematopoietic cell lineages, including blood stem cells. This gene product may be involved in the regulation of cytokine production, antigen presentation, or other processes that may also suggest a usefulness in the treatment of cancer (e.g. by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the gene or protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:72 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1040 of SEQ ID NO:72, b is an

integer of 15 to 1054, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:72, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 63

- 5 The translation product of this gene shares sequence homology with angiotensin II receptor which is thought to be important in ligand binding for blood pressure regulation. (See, e.g., GenBank Accession No. gil387891, gil1763532, and/or gil349736; all references available through these accessions are hereby incorporated herein by reference).
- 10 Preferred polypeptide fragments comprise the amino acid sequence (portion of extracellular domain):
PFWAAESALDFHWPFGGALCKMVLATVNLNVIASIFLITALSVARY (SEQ ID NO: 347). Also preferred are the polynucleotides that encode this polypeptide fragment.
- 15 This gene is expressed primarily in 7TM-pbfd and PCMIX libraries (tissue types unknown).
- Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are
- 20 not limited to, blood pressure regulatory diseases and/or disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the vascular system, expression of this gene at significantly higher or lower levels may be
- 25 routinely detected in certain tissues or cell types (e.g., cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.
- 30 Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 173 as residues: Gln-88 to Ser-97.

The tissue distribution and homology to angiotensin II receptor suggests that the protein product of this gene is useful for the study, detection, treatment, and/or prevention of vascular diseases such as blood pressure regulatory disorders. Representative uses are described elsewhere herein. In particular, the extracellular
5 region of the receptor can be used as a soluble antagonist. Moreover, the protein is useful in the detection, treatment, and/or prevention of a variety of vascular disorders and conditions, which include, but are not limited to microvascular disease, vascular leak syndrome, aneurysm, stroke, embolism, thrombosis, coronary artery disease, arteriosclerosis, and/or atherosclerosis. Furthermore, the protein may also be used to
10 determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

15 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:73 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is
20 cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 719 of SEQ ID NO:73, b is an integer of 15 to 733, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:73, and where b is greater than or equal to a + 14.

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FEATURES OF PROTEIN ENCODED BY GENE NO: 64

Preferred polypeptides of the invention comprise the following amino acid sequence: THADKNQVRNSN (SEQ ID NO: 348), QFLSWEQCTGNTESQ (SEQ
ID NO: 349), VRRPKAKGXQTSN (SEQ ID NO: 350),
30 PTQLNKHKPTTKERRRKGL (SEQ ID NO: 351), and/or LISKHENIY (SEQ ID NO: 352). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in neutrophils.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, diseases and/or disorders affecting the immune system. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in neutrophils suggests that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and/or treatment of immune system disorders, especially those affecting neutrophils. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, this gene product may be involved in the regulation of cytokine production, antigen presentation, or other processes that may also suggest a usefulness in the treatment of cancer (e.g. by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the gene or protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional

supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:74 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 771 of SEQ ID NO:74, b is an integer of 15 to 785, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:74, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 65

Preferred polypeptides of the invention comprise the following amino acid sequence: TLYIXXMXTQTWRDQGRCDXINCIV (SEQ ID NO: 353). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in brain tissue from a manic depressive, in some cancer tissues such as ovarian cancer, and in spleen from a patient with chronic lymphocytic leukemia and, to a lesser extent, in other tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, brain disorders (e.g., manic depression), and tumorigenesis. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the central nervous system (CNS), reproductive system, and immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., brain, reproductive, immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a

disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 175 as residues: Thr-29 to Ala-37, Arg-41 to Lys-46.

5 The tissue distribution primarily in brain tissue from a manic depressive indicates that the protein products of this gene are useful for diagnosing and treating manic depression and tumorigenesis.

Many polynucleotide sequences; such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:75 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 2327 of SEQ ID NO:75, b is an integer of 15 to 2341, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:75, and where b is greater than or equal to a + 14.

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FEATURES OF PROTEIN ENCODED BY GENE NO: 66

20 Preferred polypeptides of the invention comprise the following amino acid sequence: SLCTPGRGWEESWGSSLPNLTGWSVSSLDNNDV (SEQ ID NO: 354). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in metastatic melanoma spleen, rhabdomyosarcoma, and IL-1 induced neutrophils and, to a lesser extent, in other tissues.

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Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, tumorigenesis, metastasis and inflammatory disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the

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skin, connective tissue and immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., skin, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in metastatic melanoma spleen, rhabdomyosarcoma, and IL-1 induced neutrophils indicates that the protein products of this gene are useful for detection, treatment, and/or prevention of certain tumors such as melanoma, rhabdomyosarcoma and inflammatory disorders. Similarly, the tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the treatment, diagnosis, and/or prevention of various skin disorders including congenital disorders (e.g., nevi, moles, freckles, Mongolian spots, hemangiomas, port-wine syndrome), integumentary tumors (e.g., keratoses, Bowen's disease, basal cell carcinoma, squamous cell carcinoma, malignant melanoma, Paget's disease, mycosis fungoides, and Kaposi's sarcoma), injuries and inflammation of the skin (e.g., wounds, rashes, prickly heat disorder, psoriasis, dermatitis), atherosclerosis, urticaria, eczema, photosensitivity, autoimmune disorders (e.g., lupus erythematosus, vitiligo, dermatomyositis, morphea, scleroderma, pemphigoid, and pemphigus), keloids, striae, erythema, petechiae, purpura, and xanthelasma. Moreover, such disorders may predispose increased susceptibility to viral and bacterial infections of the skin (e.g., cold sores, warts, chickenpox, molluscum contagiosum, herpes zoster, boils, cellulitis, erysipelas, impetigo, tinea, athlete's foot, and ringworm). Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and immunotherapy targets for the above listed tumors and tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:76 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or

more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1868 of SEQ ID NO:76, b is an integer of 15 to 1882, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:76, and where b is greater than or equal to a + 14.

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FEATURES OF PROTEIN ENCODED BY GENE NO: 67

Preferred polypeptides of the invention comprise the following amino acid sequence:

MQVALKEDLDALKEKFRTMESNQKSSFQEIPLNEELLSKQKQLEKIESGEM
 10 GLNKVWINITEMNKQISLLTSVNHILKANVKSAA DLISLPTTVEGLQKSVASI
 GXTLNSVHLAVEALQKTVDEHKKTMELLQSDMNQHFLKETPGSNQIIPSPA
 TSELDNKTHSENKQMGDRSATLKRQSLDQVTNRDTVKIQSIKKEG (SEQ
 ID NO: 355), MQVALKEDLDALKEKFRTMESNQKSSFQEIPLNEELLSKQKQ
 (SEQ ID NO: 356),
 15 LEKIESGEMGLNKVWINITEMNKQISLLTSVNHILKANVKSAA (SEQ ID NO:
 357), DLISLPTTVEGLQKSVASIGXTLNSVHLAVEALQKTVDEHKKT (SEQ ID
 NO: 358), MELLQSDMNQHFLKETPGSNQIIPSPSATSELDNKTHSENKQ (SEQ
 ID NO: 359), and/or MGDRSATLKRQSLDQVTNRDTVKIQSIKKEG (SEQ ID
 NO: 360). Polynucleotides encoding these polypeptides are also provided.

20 This gene is expressed primarily in placental and infant brain tissues, and, to a lesser extent, in many normal and neoplastic cell types.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, developmental disorders, cancer and general growth disorders.
 25 Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the reproductive, developing, and nervous systems, expression of this gene at
 30 significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., reproductive, developmental, neural, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or

another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO:

5 177 as residues: Cys-30 to Asn-44.

The tissue distribution in infant brain and embryonic tissues suggests that polynucleotides and polypeptides corresponding to this gene are useful for the study, detection and/or treatment of growth and neoplastic disorders. Furthermore, the tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene
10 are useful for the detection, treatment, and/or prevention of cancer and other proliferative disorders. Expression within embryonic tissue and other cellular sources marked by proliferating cells suggests that this protein may play a role in the regulation of cellular division. Embryonic development also involves decisions involving cell differentiation and/or apoptosis in pattern formation. Thus this protein
15 may also be involved in apoptosis or tissue differentiation and could again be useful in cancer therapy. Alternatively, the tissue distribution in brain indicates polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of neurodegenerative disease states, behavioral disorders, or inflammatory conditions.

20 Representative uses are described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Briefly, the uses include, but are not limited to the detection, treatment, and/or prevention of Alzheimer's Disease, Parkinson's Disease, Huntington's Disease, Tourette Syndrome, meningitis, encephalitis, demyelinating
25 diseases, peripheral neuropathies, neoplasia, trauma, congenital malformations, spinal cord injuries, ischemia and infarction, aneurysms, hemorrhages, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, depression, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception. In addition, elevated
30 expression of this gene product in regions of the brain indicates it plays a role in normal neural function. Potentially, this gene product is involved in synapse formation, neurotransmission, learning, cognition, homeostasis, or neuronal

differentiation or survival. In addition, the gene or gene product may also play a role in the treatment and/or detection of developmental disorders associated with the developing embryo, or sexually-linked disorders. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:77 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 2878 of SEQ ID NO:77, b is an integer of 15 to 2892, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:77, and where b is greater than or equal to a + 14.

20 FEATURES OF PROTEIN ENCODED BY GENE NO: 68

This gene is apparently exclusively in fetal heart tissue.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, cardiovascular and growth defects. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the developing cardiovascular system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., cardiovascular, heart, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such

a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in fetal heart tissue suggests that polynucleotides and polypeptides corresponding to this gene are useful for the study, detection and/or treatment of disorders and growth defects of heart development and function. Furthermore, the tissue distribution in fetal heart tissue indicates that the protein product of this gene is useful for the detection, treatment, and/or prevention of conditions and pathologies of the cardiovascular system, such as heart disease, restenosis, atherosclerosis, stroke, angina, thrombosis, and wound healing. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:78 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1659 of SEQ ID NO:78, b is an integer of 15 to 1673, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:78, and where b is greater than or equal to a + 14.

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FEATURES OF PROTEIN ENCODED BY GENE NO: 69

This gene is expressed primarily in pancreas islet cell tumor tissue.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, digestive and metabolic defects and tumors. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes

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for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the endocrine system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., endocrine, pancreas, cancerous and wounded tissues) or
5 bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in pancreas islet cell tumor tissue suggests that
10 polynucleotides and polypeptides corresponding to this gene are useful for the study, detection and/or treatment of hormonal and neoplastic disorders of endocrine organs and metabolism. Additionally, the tissue distribution indicates the protein product of this gene is useful for the detection, treatment, and/or prevention of various endocrine disorders and cancers. Representative uses are described in the "Biological Activity",
15 "Hyperproliferative Disorders", and "Binding Activity" sections below, in Example 11, 17, 18, 19, 20 and 27, and elsewhere herein. Briefly, the protein can be used for the detection, treatment, and/or prevention of the Addison's disease, Cushing's Syndrome, and disorders and/or cancers of the pancreas (e.g., diabetes mellitus), adrenal cortex, ovaries, pituitary (e.g., hyper-, hypopituitarism), thyroid (e.g., hyper-,
20 hypothyroidism), parathyroid (e.g., hyper-, hypoparathyroidism), hypothalamus, and testes. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show
25 utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:79 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically
30 excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general

formula of a-b, where a is any integer between 1 to 1447 of SEQ ID NO:79, b is an integer of 15 to 1461, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:79, and where b is greater than or equal to a + 14.

5 FEATURES OF PROTEIN ENCODED BY GENE NO: 70

This gene is expressed primarily in tonsils.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, diseases and/or disorders of the tonsils, and disorders of the immune system. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the tonsils, and the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., tonsils, immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of a variety of immune system disorders. Expression of this gene product in tonsils suggests a role in the regulation of the proliferation; survival; differentiation; and/or activation of potentially all hematopoietic cell lineages, including blood stem cells. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, this gene product may be involved in the regulation of cytokine production, antigen presentation, or other processes that may also suggest a usefulness in the treatment of cancer (e.g. by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the gene or protein, as well as, antibodies directed against the protein may show utility as a tumor marker

and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:80 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1503 of SEQ ID NO:80, b is an integer of 15 to 1517, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:80, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 71

Preferred polypeptides of the invention comprise the following amino acid sequence: SPQFLSSKSLPT (SEQ ID NO: 361). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in infant brain and spinal cord.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, congenital brain disorders, including various forms of mental retardation, spina bifida, epilepsy, and various mood disorders, including bipolar and

unipolar depression. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the central nervous system, expression of this gene at
5 significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., brain, CNS, cancerous and wounded tissues) or bodily fluids (e.g., lymph, amniotic fluid, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily
10 fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 181 as residues: Pro-42 to Lys-49, Lys-56 to Lys-71.

The tissue distribution in infant brain and spinal cord suggests that polynucleotides and polypeptides corresponding to this gene are useful for the
15 diagnosis and/or treatment of disorders of the brain and nervous system, including congenital brain disorders, including various forms of mental retardation, spina bifida, epilepsy, and various mood disorders, including bipolar and unipolar depression. It may also be useful in the treatment of such neurodegenerative disorders as schizophrenia; ALS; or Alzheimer's. Protein, as well as, antibodies directed against
20 the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:81 and may have been publicly available prior to conception of
25 the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 560 of SEQ ID NO:81, b is an
30 integer of 15 to 574, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:81, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 72

Preferred polypeptides of the invention comprise the following amino acid sequence:

GPPSPRGLPSLPLHLPAPRRYLQSR YACSQSSVSAAARRWGSGWMAWDPWN

5 QASGRYARITLLSVQACHQ

PTVWPRAGHSLPER YSLPHNGDSTHLSGLLTVKCGA (SEQ ID NO: 362),

GPPSPRGLPSLPLHLPAPRRYLQSR YACSQSSVSAAA (SEQ ID NO: 363),

RRWGSGWMAWDPWNQASGRYARITLLSVQACHQ (SEQ ID NO: 364), and/or

PTVWPRAGHSLPER YSLPHNGDSTHLSGLLTVKCGA (SEQ ID NO: 365).

10 Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in neutrophils.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, infection, inflammation and other immune reactions or disorders.

15 Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

25 The tissue distribution in neutrophils indicates that the protein products of this gene are useful for detection, treatment, and/or prevention of immune disorders, such as infection, inflammation, allergy and immunodeficiency. Therefore, this gene product may have clinical relevance in the treatment of impaired immunity, in the correction of autoimmunity, in immune modulation, in the treatment of allergy, and in the regulation of inflammation. It may also play a role in influencing differentiation of specific hematopoietic lineages, and may even affect the hematopoietic stem cell.

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Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:82 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1441 of SEQ ID NO:82, b is an integer of 15 to 1455, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:82, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 73

Preferred polypeptides of the invention comprise the following amino acid sequence: NQENSLQTN SYLDSTESK (SEQ ID NO: 366). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in neutrophils and activated T-cells.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, immune system disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution neutrophils and T-cells indicates that the protein products of this gene are useful for diagnosis and treatment of immune related disorders including, infection, inflammation, allergy, tissue/organ transplantation, immunodeficiency, etc. Therefore, this gene product may have clinical relevance in the treatment of impaired immunity, in the correction of autoimmunity, in immune modulation, in the treatment of allergy, and in the regulation of inflammation. It may also play a role in influencing differentiation of specific hematopoietic lineages, and may even affect the hematopoietic stem cell. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:83 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1626 of SEQ ID NO:83, b is an integer of 15 to 1640, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:83, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 74

This gene is expressed primarily in hemangiopericytoma, placental tissue, and breast and endometrial tumor tissues, and, to a lesser extent, in various other normal and transformed cell types.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, defects and tumors of female reproductive organs. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the

reproductive system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., reproductive, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having
5 such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in endometrial tumor tissue and placental tissue suggests that polynucleotides and polypeptides corresponding to this gene are useful for the study, detection and/or treatment of reproductive system disorders and
10 neoplasias, as well as cancers of other tissues where expression of this gene has been observed. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show
15 utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:84 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically
20 excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 511 of SEQ ID NO:84, b is an integer of 15 to 525, where both a and b correspond to the positions of nucleotide
25 residues shown in SEQ ID NO:84, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 75

In an alternative reading frame, this gene shares homology with a DNA mismatch repair proteins, including PMS 4, and PMS1 (See Accession No. R95251,
30 gnllPIDId1008095 and pirlJC2399IJC2399).

Preferred amino acid fragments comprise the amino acid sequence:
QKRACFPFAFCRDCQFXEXSPAMLPVQPAXL (SEQ ID NO: 367),

VSAHGIWLFRRS (SEQ ID NO: 368), KHAAPPASLSLSLLLHHGQKR
ACFPFAFCRDCQFXEXSPAMLPVQPAXL (SEQ ID NO: 369). Polynucleotides
encoding these polypeptides are also provided.

This gene is expressed primarily in hematopoietic cells and tissues, such as
5 monocytes, primary dendritic cells, and thymus; and, to a lesser extent, in brain.

Therefore, polynucleotides and polypeptides of the invention are useful as
reagents for differential identification of the tissue(s) or cell type(s) present in a
biological sample and for diagnosis of diseases and conditions which include, but are
not limited to, hematopoietic diseases and/or disorders; immune dysfunction;
10 susceptibility to infection; impaired immune surveillance; neurological disorders, and
cancers which may result from increased genetic instability. Similarly, polypeptides
and antibodies directed to these polypeptides are useful in providing immunological
probes for differential identification of the tissue(s) or cell type(s). For a number of
disorders of the above tissues or cells, particularly of the immune system, CNS, and
15 solid tissues, expression of this gene at significantly higher or lower levels may be
routinely detected in certain tissues or cell types (e.g., hematopoietic, cancerous and
wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid
and spinal fluid) or another tissue or cell sample taken from an individual having such
a disorder, relative to the standard gene expression level, i.e., the expression level in
20 healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution primarily in hematopoietic cells and tissues and the
homology to DNA mismatch repair proteins indicates that the protein product of this
gene is useful for the diagnosis and/or treatment of a variety of disorders, especially
cancer. Representative uses are described in the "Immune Activity" and "Infectious
25 Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere
herein. Briefly, the expression of this gene product in a number of hematopoietic cells
and tissues suggests that it may play a role in the proliferation; differentiation;
survival; and/or activation of a variety of hematopoietic lineages, particularly the
monocyte/macrophage pathway.

30 Expression of this gene product in a variety of brain tissues also suggests that
it may play a role in normal neuronal function or in establishment of neural
connectivity. Therefore, it may be useful in the treatment of neurological disorders,

such as Alzheimer's or Parkinson's. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:85 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 823 of SEQ ID NO:85, b is an integer of 15 to 837, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:85, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 76

This gene is expressed primarily in T-cell lymphoma, endometrial tumors, and infant brain cells.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, T-cell lymphoma, endometrial tumor, and neurodegenerative or developmental diseases and/or disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune, central nervous system, and reproductive systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., neural, immune, reproductive, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken

from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO:
5 186 as residues: Glu-28 to Tyr-33, Gly-50 to Tyr-57.

The tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for detecting and/or treating T-cell lymphoma, endometrial tumors, neurodegenerative or developmental disorders. The tissue distribution in infant brain cells suggests that polynucleotides and polypeptides
10 corresponding to this gene are useful for the detection/treatment of neurodegenerative disease states and behavioural disorders.

Representative uses are described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Briefly, the uses include, but are not limited to the detection,
15 treatment, and/or prevention of Alzheimers Disease, Parkinsons Disease, Huntingtons Disease, Tourette Syndrome, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception. In addition, the gene or gene product may also play a role in the treatment
20 and/or detection of developmental disorders associated with the developing embryo, or sexually-linked disorders. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may
25 show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:86 and may have been publicly available prior to conception of
30 the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or

more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1560 of SEQ ID NO:86, b is an integer of 15 to 1574, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:86, and where b is greater than or equal to a + 14.

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FEATURES OF PROTEIN ENCODED BY GENE NO: 77

This gene is expressed primarily in cancer cells, particular from hepatocellular carcinoma.

Therefore, polynucleotides and polypeptides of the invention are useful as
10 reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, hepatocellular carcinoma and other similar cancer, particularly of the liver. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell
15 type(s). For a number of disorders of the above tissues or cells, particularly of the hepatic system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., hepatic, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such
20 a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in tissues of cancerous origins, such as hepatocellular carcinoma tissue, suggests that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and/or treatment of a variety of cancers, most
25 notably cancers of the liver, such as hepatocellular carcinoma. Expression of this gene product in a variety of cancers suggests that this gene may be a player in the progression of these diseases, and may be a beneficial target for inhibitors as therapeutics. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

30 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:87 and may have been publicly available prior to conception of

the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general
5 formula of a-b, where a is any integer between 1 to 1614 of SEQ ID NO:87, b is an integer of 15 to 1628, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:87, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 78

10 This gene is expressed primarily in T-cell lymphoma, and, to a lesser extent, in hepatocellular tumor tissue.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are
15 not limited to, T-cell lymphoma, hepatocellular tumors, and cancers. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune and hepatic systems, expression of this gene at significantly higher or lower
20 levels may be routinely detected in certain tissues or cell types (e.g., immune, hepatic, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the
25 disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 188 as residues: Pro-46 to Asn-58.

The tissue distribution in T-cell lymphoma and hepatocellular tumor tissue suggests that polynucleotides and polypeptides corresponding to this gene are useful
30 for the detection and/or treatment of T-cell lymphomas and hepatocellular tumors, as well as cancers of other tissues where expression of this gene has been observed. Representative uses are described in the "Immune Activity" and "Infectious Disease"

sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement.

- 5 Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:88 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1781 of SEQ ID NO:88, b is an integer of 15 to 1795, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:88, and where b is greater than or equal to a + 14.

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FEATURES OF PROTEIN ENCODED BY GENE NO: 79

This gene is expressed primarily in brain tissue, and, to a lesser extent, in ntera2 cell lines, melanocytes, normal colon, and T-helper cells.

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Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, neurodegenerative diseases and/or conditions. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the nervous system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., neural, immune, hematopoietic, gastrointestinal, and cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e.,

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the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 189 as residues: Met-1 to Trp-6.

5 The tissue distribution in brain tissue suggests that polynucleotides and polypeptides corresponding to this gene are useful for detecting and/or treating neurodegenerative diseases of the central nervous system. Representative uses are described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Briefly, the tissue distribution
10 suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection/treatment of neurodegenerative disease states and behavioural disorders such as Alzheimers Disease, Parkinsons Disease, Huntingtons Disease, Tourette Syndrome, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, panic disorder, learning disabilities, ALS, psychoses, autism, and altered
15 behaviors, including disorders in feeding, sleep patterns, balance, and perception. In addition, the gene or gene product may also play a role in the treatment and/or detection of developmental disorders associated with the developing embryo, or sexually-linked disorders. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or
20 receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly
25 available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:89 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or
30 more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1850 of SEQ ID NO:89, b is an

integer of 15 to 1864, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:89, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 80

5 The gene encoding the disclosed cDNA is thought to reside on chromosome 1. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 1.

 Preferred polypeptides of the invention comprise the following amino acid sequence: IPEEASCFPSAV (SEQ ID NO: 370), EILFGKLKSKAALCTQG (SEQ ID
10 NO: 371), HADRYTCCRCLSPFSLAGL (SEQ ID NO: 372), LSDPLLLPDCSFSFN (SEQ ID NO: 373), KAVAYANVSCRRFKHKTTLGPIQW (SEQ ID NO: 374), PSSQSPEPPQPLSLFVTRLPNLYDFP (SEQ ID NO: 375), and/or SRQIICTNLCKCTPICFLF (SEQ ID NO: 376). Polynucleotides encoding these polypeptides are also provided.

15 This gene is expressed primarily in breast tissue, fetal liver and adult hepatoma tissues, and, to a lesser extent, in merkel cells and osteoblasts.

 Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are
20 not limited to, cancers of the liver or breast. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the glandular systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain
25 tissues or cell types (e.g., breast, liver, cancerous and wounded tissues) or bodily fluids (e.g., lymph, breast milk, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

30 Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 190 as residues: Asn-25 to Gln-50.

The tissue distribution in breast and hepatoma tissues suggests that polynucleotides and polypeptides corresponding to this gene are useful for diagnosing and/or treating tumors of the breast or liver. Furthermore, the expression in the breast tissue may indicate its uses in breast neoplasia and breast cancers, such as

5 fibroadenoma, papillary carcinoma, ductal carcinoma, Paget's disease, medullary carcinoma, mucinous carcinoma, tubular carcinoma, secretory carcinoma and apocrine carcinoma, as well as juvenile hypertrophy and gynecomastia, mastitis and abscess, duct ectasia, fat necrosis and fibrocystic diseases.

Alternatively, the tissue distribution suggests that polynucleotides and

10 polypeptides corresponding to this gene are useful for the detection and treatment of liver disorders and cancers (e.g. hepatoblastoma, jaundice, hepatitis, liver metabolic diseases and conditions that are attributable to the differentiation of hepatocyte progenitor cells). Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and immunotherapy targets for the above listed tumors and

15 tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:90 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically

20 excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1969 of SEQ ID NO:90, b is an integer of 15 to 1983, where both a and b correspond to the positions of nucleotide

25 residues shown in SEQ ID NO:90, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 81

This gene is expressed primarily in thymus and brain tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as

30 reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, diseases and/or disorders of the immune system and diseases of the

brain, including various types of mood disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system and central nervous system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, neural, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of a variety of immune system disorders. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, the expression of this gene product in thymus suggests a role in the regulation of the proliferation; survival; differentiation; and/or activation of potentially all hematopoietic cell lineages, including blood stem cells. This gene product may be involved in the regulation of cytokine production, antigen presentation, or other processes that may also suggest a usefulness in the treatment of cancer (e.g. by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the gene or protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Alternatively, the tissue distribution in brain tissue suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection/treatment of neurodegenerative disease states and behavioural disorders such as Alzheimers Disease, Parkinsons Disease, Huntingtons Disease, Tourette

Syndrome, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception. In addition, the gene or gene product may also play a role in the treatment and/or detection of

5 developmental disorders associated with the developing embryo, or sexually-linked disorders. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show

10 utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:91 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically

15 excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1943 of SEQ ID NO:91, b is an integer of 15 to 1957, where both a and b correspond to the positions of nucleotide

20 residues shown in SEQ ID NO:91, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 82

Preferred polypeptides of the invention comprise the following amino acid sequences: MLLPVNTLLYI (SEQ ID NO: 377), LLTPLCFFYGTSRP (SEQ ID NO:

25 378), PYLELVT (SEQ ID NO: 379), LLKKKKQSVGFSV (SEQ ID NO: 380), CILEAGR (SEQ ID NO: 381), MGFSAPTPGPL (SEQ ID NO: 382), FDLRRLILSIV (SEQ ID NO: 383), AFCPHVTPCKYAVIHTV (SEQ ID NO: 384), NTPLLFLWDLQ (SEQ ID NO: 385), ATIFRTSYLIKKEKTV (SEQ ID NO: 386), WLLSLHLGGREVRAGAP (SEQ ID NO: 387), QTLQEGSLHSI (SEQ ID NO:

30 388), and/or

MGFSAPTPGPLFDLRLILSIVAFCPHVTPCKYAVIHTVNTPLLFLWDLQATIF

RTSYLIKKEKTVCWLLSLHLGGREVRAGAPQTLQEGSLHSI (SEQ ID NO: 389). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in brain and breast tissues, and, to a lesser extent, in several other cell and tissue types including colon and liver tissues.

5 Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, breast and brain cancers, mood disorders, dementia, and Alzheimer's disease. Similarly, polypeptides and antibodies directed to these polypeptides are
10 useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the central nervous and lactations systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., neural, reproductive, cancerous and wounded tissues) or bodily fluids (e.g., lymph,
15 breast milk, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO:
20 192 as residues: Gly-21 to Tyr-27.

The expression of this gene in breast tissue may indicate its uses in breast neoplasia and breast cancers, such as fibroadenoma, papillary carcinoma, ductal carcinoma, Paget's disease, medullary carcinoma, mucinous carcinoma, tubular carcinoma, secretory carcinoma and apocrine carcinoma, as well as juvenile
25 hypertrophy and gynecomastia, mastitis and abscess, duct ectasia, fat necrosis and fibrocystic diseases. Representative uses are described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Alternatively, the tissue distribution of this gene in brain tissue suggests that the translation product of this gene is useful for the detection and/or
30 treatment of brain cancers and neural disorders, such as Alzheimer's Disease, Parkinson's Disease, Huntingtons Disease, Tourette Syndrome, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, panic disorder, learning

disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception.

In addition, the gene or gene product may also play a role in the treatment and/or detection of developmental disorders associated with the developing embryo, or sexually-linked disorders. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:92 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 559 of SEQ ID NO:92, b is an integer of 15 to 573, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:92, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 83

This gene is expressed primarily in liver and, to a lesser extent, in other tissues.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, liver/hepatocyte disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the liver, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell

types (e.g., liver, cancerous and wounded tissues) or bodily fluids (e.g., lymph, bile, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in liver indicates that the protein products of this gene are useful for detection, treatment, and/or prevention of liver (hepatocyte) disorders and cancers (e.g., hepatoblastoma, jaundice, hepatitis, liver metabolic diseases and conditions that are attributable to the differentiation of hepatocyte progenitor cells). Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and immunotherapy targets for the above listed tumors and tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:93 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1198 of SEQ ID NO:93, b is an integer of 15 to 1212, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:93, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 84

Preferred polypeptides of the invention comprise the following amino acid sequence: YWVSISQRSVCQQARTSIFFKDGLSREKYSNNG (SEQ ID NO: 390). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in T cells.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, immune disorders, including AIDS and various other diseases in which the immune system is suppressed. Similarly, polypeptides and antibodies directed to

these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

10 The tissue distribution in T cells indicates that the polypeptides or polynucleotides are useful for treatment, prophylaxis, and diagnosis of immune and autoimmune diseases, such as lupus, transplant rejection, allergic reactions, arthritis, asthma, immunodeficiency diseases, leukemia, and AIDS. The polypeptides or polynucleotides of the present invention are also useful in the treatment, prophylaxis, and detection of thymus disorders, such as Grave's Disease, lymphocytic thyroiditis, hyperthyroidism, and hypothyroidism. Similarly, elevated levels of expression of this gene product in T cell lineages suggests that it may play an active role in normal T cell function and in the regulation of the immune response. For example, this gene product may be involved in T cell activation, in the activation or control of differentiation of other hematopoietic cell lineages, in antigen recognition, or in T cell proliferation. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

25 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:94 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1130 of SEQ ID NO:94, b is an integer of 15 to 1144, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:94, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 85

The translation product of this gene shares sequence homology with a protein which was found to accumulate during growth-factor-induced proliferation and transformation of normal rat fibroblasts (See, Glaichenhaus, N., and Cuzin, F., Cell 50:1081 (1987); and Genbank Acc. No. gil207250).

Preferred polypeptides of the invention comprise the following amino acid sequence:

LSVRAPGVPAARPRLSSARQAGAGRGELRGQRLWLGPECGCGAGQAGSMLR
 10 AVGSLLRLGRGLTVRCGPGAPLEATRRPAPALPPRGLPCYSSGGAPSNSGPQG
 HGEIHRVPTQRRPSQFDKKILLWTGRFKSMEEIPPRIPPEMIDTARNKARVKAC
 YI (SEQ ID NO: 391), LSVRAPGVPAARPRLSSARQAGAGRGELRGQRLWLG
 (SEQ ID NO: 392), PECGCGAGQAGSMLRAVGSLLRLGRGLTVRCGPG (SEQ
 ID NO: 393), APLEATRRPAPALPPRGLPCYSSGGAPSNSGPQG (SEQ ID NO:
 15 394), HGEIHRVPTQRRPSQFDKKILLWTGRF (SEQ ID NO: 395), and/or
 KSMEEIPPRIPPEMIDTARNKARVKACYI (SEQ ID NO: 396). Polynucleotides
 encoding these polypeptides are also provided.

This gene is expressed primarily in placenta.

Therefore, polynucleotides and polypeptides of the invention are useful as
 20 reagents for differential identification of the tissue(s) or cell type(s) present in a
 biological sample and for diagnosis of diseases and conditions which include, but are
 not limited to, developmental anomalies or fetal deficiencies, cancers or neoplastic
 conditions. Similarly, polypeptides and antibodies directed to these polypeptides are
 useful in providing immunological probes for differential identification of the tissue(s)
 25 or cell type(s). For a number of disorders of the above tissues or cells, particularly of
 the developing embryo, expression of this gene at significantly higher or lower levels
 may be routinely detected in certain tissues or cell types (e.g., embryonic, placental,
 cancerous and wounded tissues) or bodily fluids (e.g., lymph, amniotic fluid, serum,
 plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken
 30 from an individual having such a disorder, relative to the standard gene expression
 level, i.e., the expression level in healthy tissue or bodily fluid from an individual not
 having the disorder.

The tissue distribution and homology to a protein which was found to accumulate during proliferation and transformation of normal fibroblasts suggests that the protein product of this gene is useful for the treatment and diagnosis of developmental anomalies or fetal deficiencies, neoplasms and cancers. Additionally, the tissue distribution in placenta suggests that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and/or treatment of disorders of the placenta. Specific expression within the placenta suggests that this gene product may play a role in the proper establishment and maintenance of placental function. Alternately, this gene product may be produced by the placenta and then transported to the embryo, where it may play a crucial role in the development and/or survival of the developing embryo or fetus. Expression of this gene product in a vascular-rich tissue such as the placenta also suggests that this gene product may be produced more generally in endothelial cells or within the circulation. In such instances, it may play more generalized roles in vascular function, such as in angiogenesis. It may also be produced in the vasculature and have effects on other cells within the circulation, such as hematopoietic cells. It may serve to promote the proliferation, survival, activation, and/or differentiation of hematopoietic cells, as well as other cells throughout the body. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:95 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1260 of SEQ ID NO:95, b is an integer of 15 to 1274, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:95, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 86

The gene encoding the disclosed cDNA is thought to reside on chromosome 3. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 3.

5 This gene is expressed primarily in T-cell lymphoma and synovial sarcoma tissues, and, to a lesser extent, in fetal liver/spleen tissue and synovial fibroblasts.

 Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are
10 not limited to, T-Cell lymphoma and synovial sarcoma. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain
15 tissues or cell types (e.g., immune, hematopoietic, and cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid or spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

20 Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 196 as residues: Gly-4 to His-10, Asp-32 to Val-38.

 The tissue distribution in T-cell lymphoma and synovial sarcoma tissues suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection and/or treatment of T-cell lymphomas and synovial sarcomas, as
25 well as cancers of other tissues where expression of this gene has been observed. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents
30 that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:96 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1766 of SEQ ID NO:96, b is an integer of 15 to 1780, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:96, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 87

The gene encoding the disclosed cDNA is believed to reside on chromosome 10. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 10.

This gene is expressed primarily in brain and kidney.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, kidney diseases and various diseases of the brain including mood disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the brain and renal systems, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., kidney, CNS, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid or cerebrospinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 197 as residues: Arg-68 to Lys-78.

The tissue distribution in kidney suggests that this gene or gene product is useful in the treatment and/or detection of kidney diseases including renal failure, nephritis, renal tubular acidosis, proteinuria, pyuria, edema, pyelonephritis, hydronephritis, nephrotic syndrome, crush syndrome, glomerulonephritis, hematuria, renal colic and kidney stones, in addition to Wilm's Tumor Disease, and congenital kidney abnormalities such as horseshoe kidney, polycystic kidney, and Falconi's syndrome. Alternatively, the tissue distribution in brain suggests that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and/or treatment of disorders of the brain and nervous system. It may be useful in the treatment of such neurodegenerative disorders as schizophrenia, ALS, or Alzheimer's. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:97 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 2051 of SEQ ID NO:97, b is an integer of 15 to 2065, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:97, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 88

It has been discovered that this gene is expressed primarily in neutrophils.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, immune and inflammatory disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune and inflammatory systems,

expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 198 as residues: Pro-41 to Gln-48.

The tissue distribution in neutrophils indicates that the protein products of this gene are useful for the study, diagnosis and/or treatment of immune and inflammatory diseases. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, the expression of this gene product indicates a role in regulating the proliferation; survival; differentiation; and/or activation of hematopoietic cell lineages, including blood stem cells. Furthermore, this gene product may be involved in the regulation of cytokine production, antigen presentation, or other processes that may also suggest a usefulness in the treatment of cancer (e.g., by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the gene or protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:98 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1140 of SEQ ID NO:98, b is an integer of 15 to 1154, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:98, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 89

Preferred polypeptides of the invention comprise the following amino acid sequence: ELAIGESCS (SEQ ID NO: 397). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in brain.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, developmental, degenerative and behavioral diseases of the brain such as schizophrenia, Alzheimer's disease, Parkinson's disease, Huntington's disease, transmissible spongiform encephalopathies (TSE), Creutzfeldt-Jakob disease (CJD), specific brain tumors, aphasia, mania, depression, dementia, paranoia, addictive behavior and sleep disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the brain, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., CNS, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid or cerebrospinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e.,

the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 199 as residues: Gly-45 to Thr-50.

5 The tissue distribution in brain indicates polynucleotides and polypeptides corresponding to this gene are useful for the detection, treatment, and/or prevention of neurodegenerative disease states, behavioral disorders, or inflammatory conditions. Representative uses are described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Briefly,
10 the uses include, but are not limited to the detection, treatment, and/or prevention of Alzheimer's Disease, Parkinson's Disease, Huntington's Disease, Tourette Syndrome, meningitis, encephalitis, demyelinating diseases, peripheral neuropathies, neoplasia, trauma, congenital malformations, spinal cord injuries, ischemia and infarction, aneurysms, hemorrhages, schizophrenia, mania, dementia, paranoia, obsessive
15 compulsive disorder, depression, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception.

In addition, elevated expression of this gene product in regions of the brain indicates it plays a role in normal neural function. Potentially, this gene product is
20 involved in synapse formation, neurotransmission, learning, cognition, homeostasis, or neuronal differentiation or survival. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the
25 protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:99 and may have been publicly available prior to conception of
30 the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or

more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 601 of SEQ ID NO:99, b is an integer of 15 to 615, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:99, and where b is greater than or equal to a + 14.

5

FEATURES OF PROTEIN ENCODED BY GENE NO: 90

This gene is expressed primarily in brain tissue.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, neurological and behavioural disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the central nervous system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., CNS, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid or cerebrospinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in brain indicates that the protein products of this gene are useful for the detection/treatment of neurodegenerative disease states and behavioural disorders such as Alzheimer's Disease, Parkinson's Disease, Huntington's Disease, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder and panic disorder. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:100 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is

30

cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1610 of SEQ ID NO:100, b is an integer of 15 to 1624, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:100, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 91

Preferred polypeptides of the invention comprise the following amino acid sequence: PVIWPDGKRIVLLAEVS (SEQ ID NO: 398). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in adrenal gland tumor.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, adrenal gland cancer. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the adrenal system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., adrenal gland, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 201 as residues: Arg-49 to Gln-56.

The tissue distribution in adrenal gland indicates that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and/or treatment of disorders involving the adrenal gland. Expression of this gene product in adrenal gland tumor indicates that it may play a role in the proliferation of cells of the adrenal gland, or potentially in the proliferation of cells in general. In such an event, it may play a role in determining the course and severity of cancer. Alternatively, it may play

a role in the normal function of adrenal glands, such as in the production of corticosteroids, androgens, or epinephrines. Thus it may play a role in general homeostasis, as well as in disorders involving the androgen hormones. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker
5 and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:101 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically
10 excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1742 of SEQ ID NO:101, b is an integer of 15 to 1756, where both a and b correspond to the positions of nucleotide
15 residues shown in SEQ ID NO:101, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 92

The gene encoding the disclosed cDNA is thought to reside on chromosome 2. Accordingly, polynucleotides related to this invention are useful as a marker in
20 linkage analysis for chromosome 2.

This gene is expressed in multiple tissues, including the thymus, and cell types, including B cells and monocytes.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a
25 biological sample and for diagnosis of diseases and conditions which include, but are not limited to, disorders and/or disorders afflicting the immune system, such as AIDS and autoimmune diseases. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above
30 tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph,

serum, plasma, urine, synovial fluid and spinal fluid) taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in immune system tissues and cells suggests that
5 polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and/or treatment of disorders affecting the immune system, especially autoimmune diseases and AIDS. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, this gene product may be involved in the
10 regulation of cytokine production, antigen presentation, or other processes that may also suggest a usefulness in the treatment of cancer (e.g. by boosting immune responses).

Since the gene is expressed in cells of lymphoid origin, the gene or protein, as well as, antibodies directed against the protein may show utility as a tumor marker
15 and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of
20 various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show
25 utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:102 and may have been publicly available prior to conception
of the present invention. Preferably, such related polynucleotides are specifically
30 excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general

formula of a-b, where a is any integer between 1 to 1402 of SEQ ID NO:102, b is an integer of 15 to 1416, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:102, and where b is greater than or equal to a + 14.

5 FEATURES OF PROTEIN ENCODED BY GENE NO: 93

This gene is expressed primarily in fetal lung tissue.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, lung diseases and/or disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the lung, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., pulmonary, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, sputum, pulmonary surfactant, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 203 as residues: Leu-32 to His-38.

The tissue distribution in fetal lung tissue suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection and/or treatment of lung diseases and/or disorders. Representative uses are described elsewhere herein. Furthermore, the tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection and treatment of disorders associated with developing lungs, particularly in premature infants where the lungs are the last tissues to develop. The tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and intervention of lung tumors, since the gene may be involved in the regulation of cell division, particularly since it is expressed in fetal tissue. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to

isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

- 5 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:103 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is
10 cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 690 of SEQ ID NO:103, b is an integer of 15 to 704, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:103, and where b is greater than or equal to a + 14.

15

FEATURES OF PROTEIN ENCODED BY GENE NO: 94

- Preferred polypeptides of the invention comprise the following amino acid sequence: CFLSVSFQWN (SEQ ID NO: 399), VTIAQVGIFVCFVHCCT (SEQ ID NO: 400), PGQVPSKHLGSNASVRA (SEQ ID NO: 401),
20 DEGAKVQRRPWGSQTHSPVLFL (SEQ ID NO: 402), LTRPGLWGSLLPVQQQRG (SEQ ID NO: 403), CASLGVLNRANRSPCV (SEQ ID NO: 404), SWLEVTTLSAPGPVITTY (SEQ ID NO: 405), PGQWVREIXLVGRAVARV (SEQ ID NO: 406), LTWPPXGPMGTVPWPGF (SEQ ID NO: 407), MADIPGTFLALGCHGQR (SEQ ID NO: 408),
25 VGRGSWASGWTNQSA (SEQ ID NO: 409), and/or PDHPLPVGLLEAWRVE (SEQ ID NO: 410). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily neutrophils and eosinophils, and, to a lesser extent, in bone marrow and fetal liver/spleen tissue.

- Therefore, polynucleotides and polypeptides of the invention are useful as
30 reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, asthma and diseases and/or disorders afflicting the immune system.

Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

10 Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 204 as residues: Ser-2 to Trp-7.

The tissue distribution in immune system cells and tissues suggests that polynucleotides and polypeptides corresponding to this gene are useful for the diagnosis and/or treatment of asthma or other disorders affecting the immune system. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, this gene product may be involved in the regulation of cytokine production, antigen presentation, or other processes that may also suggest a usefulness in the treatment of cancer (e.g. by boosting immune responses).

20 Since the gene is expressed in cells of lymphoid origin, the gene or protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues. Therefore it may be also used as an agent for immunological disorders including arthritis, asthma, immune deficiency diseases such as AIDS, leukemia, rheumatoid arthritis, inflammatory bowel disease, sepsis, acne, and psoriasis. In addition, this gene product may have commercial utility in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:104 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1245 of SEQ ID NO:104, b is an integer of 15 to 1259, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:104, and where b is greater than or equal to a + 14.

FEATURES OF PROTEIN ENCODED BY GENE NO: 95

This gene shares sequence homology to the rat cornichon-like protein (See Genbank Accession No. 2317276), the murine cornichon protein (See Genbank Accession No. gil2460430), and the human cornichon protein (See Genbank Accession No. gil4063709). The Drosophila cornichon gene is thought to be involved in signaling processes necessary for both anterior-posterior and dorsal-ventral pattern formation in Drosophila. Thus, it is likely that this gene plays a similar role in human development.

The gene encoding the disclosed cDNA is thought to reside on chromosome 1. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 1.

This gene is expressed primarily in endometrial tumor tissue and infant brain tissue, and, to a lesser extent, in frontal cortex tissue.

Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, endometrial tumor, and neural and developmental diseases and/or disorders. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the neural and reproductive organs, expression of this gene at

significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., neural, reproductive, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, amniotic fluid, synovial fluid and spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative
5 to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 205 as residues: Glu-33 to Phe-38.

The tissue distribution in infant brain tissue and frontal cortex tissue, and the
10 homology to cornichon proteins, suggests that polynucleotides and polypeptides corresponding to this gene are useful for detecting and/or treating neural and developmental disorders. The tissue distribution suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection/treatment of neurodegenerative disease states and behavioural disorders such as Alzheimers
15 Disease, Parkinsons Disease, Huntingtons Disease, Tourette Syndrome, schizophrenia, mania, dementia, paranoia, obsessive compulsive disorder, panic disorder, learning disabilities, ALS, psychoses, autism, and altered behaviors, including disorders in feeding, sleep patterns, balance, and perception. In addition, the gene or gene product may also play a role in the treatment and/or detection of
20 developmental disorders associated with the developing embryo, or sexually-linked disorders.

Representative uses are described in the "Regeneration" and "Hyperproliferative Disorders" sections below, in Example 11, 15, and 18, and elsewhere herein. Briefly, the elevated expression of this gene product within the
25 frontal cortex of the brain suggests that it may be involved in neuronal survival; synapse formation; conductance; neural differentiation, etc. Such involvement may impact many processes, such as learning and cognition. Alternatively, the tissue distribution in endometrial tumor tissue suggests that the translation product of this gene is useful for the detection and/or treatment of endometrial tumors and/or
30 reproductive disorders, as well as tumors of other tissues where expression of this gene has been observed. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or

receptors, to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

5 Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:105 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is
10 cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 1790 of SEQ ID NO:105, b is an integer of 15 to 1804, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:105, and where b is greater than or equal to a + 14.

15

FEATURES OF PROTEIN ENCODED BY GENE NO: 96

The translation product of this gene shares significant sequence homology with a protein which was recently sequenced by another group, which was named paraplegin by this group (See Genbank Accession No. g3273089). The gene encoding
20 the disclosed cDNA is thought to reside on chromosome 16. Accordingly, polynucleotides related to this invention are useful as a marker in linkage analysis for chromosome 16.

Preferred polypeptides of the invention comprise the following amino acid sequence:

25 LARADPPGCRRRGWRPSSAELQLRLLTPTFEGINGLLKQHLVQNPVRLWQL
LGGTFYFNTSRLKQKNKE KDKSKGKAPEEDEXERRRRERDDQ (SEQ ID NO:
411). Polynucleotides encoding these polypeptides are also provided.

When tested against Jurkat T-cell cell lines, supernatants removed from cells containing this gene activated the GAS assay. Thus, it is likely that this gene activates
30 T-cells, and to a lesser extent other immune cells, through the Jak-STAT signal transduction pathway. The gamma activating sequence (GAS) is a promoter element found upstream of many genes which are involved in the Jak-STAT pathway. The

Jak-STAT pathway is a large, signal transduction pathway involved in the differentiation and proliferation of cells. Therefore, activation of the Jak-STAT pathway, reflected by the binding of the GAS element, can be used to indicate proteins involved in the proliferation and differentiation of cells.

- 5 This gene is expressed primarily in Jurkat T-cells, Macrophage, T-Cell Lymphoma, tonsils, and salivary glands.

 Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, T-Cell lymphomas. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the immune system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., immune, hematopoietic, and cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid or spinal fluid) or another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

- 20 Preferred epitopes include those comprising a sequence shown in SEQ ID NO: 206 as residues: Met-1 to Leu-6, Asp-84 to Lys-89, Asp-124 to Gly-130, Ser-138 to Trp-143, His-145 to Ser-153, Thr-170 to Pro-183, Trp-191 to Pro-198.

 The tissue distribution in immune tissues and T-cells, in conjunction with the detected GAS biological activity data, suggests that polynucleotides and polypeptides corresponding to this gene are useful for the detection and/or treatment of T-cell lymphomas. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections below, in Example 11, 13, 14, 16, 18, 19, 20, and 27, and elsewhere herein. Briefly, the expression of this gene product in T cell lymphoma suggests that it may play a role in the proliferation of the lymphoid cell lineages, and may be involved in normal antigen recognition and activation of T cells during the immune process. Furthermore, the protein may also be used to determine biological activity, to raise antibodies, as tissue markers, to isolate cognate ligands or receptors,

to identify agents that modulate their interactions, in addition to its use as a nutritional supplement. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly
5 available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:106 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or
10 more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 957 of SEQ ID NO:106, b is an integer of 15 to 971, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:106, and where b is greater than or equal to a + 14.

15 **FEATURES OF PROTEIN ENCODED BY GENE NO: 97**

Preferred polypeptides of the invention comprise the following amino acid sequence: FLRFWCTCHVSS (SEQ ID NO: 412). Polynucleotides encoding these polypeptides are also provided.

This gene is expressed primarily in bladder.

20 Therefore, polynucleotides and polypeptides of the invention are useful as reagents for differential identification of the tissue(s) or cell type(s) present in a biological sample and for diagnosis of diseases and conditions which include, but are not limited to, diseases of the bladder, including bladder cancer. Similarly, polypeptides and antibodies directed to these polypeptides are useful in providing
25 immunological probes for differential identification of the tissue(s) or cell type(s). For a number of disorders of the above tissues or cells, particularly of the urinary system, expression of this gene at significantly higher or lower levels may be routinely detected in certain tissues or cell types (e.g., bladder, cancerous and wounded tissues) or bodily fluids (e.g., lymph, serum, plasma, urine, synovial fluid and spinal fluid) or
30 another tissue or cell sample taken from an individual having such a disorder, relative to the standard gene expression level, i.e., the expression level in healthy tissue or bodily fluid from an individual not having the disorder.

The tissue distribution in bladder indicates that the polynucleotides and polypeptides corresponding to this gene are useful for treatment and/or diagnosis of urinary tract disorders (e.g., cystitis, urinary tract calculi, incontinence) and bladder tumors or cancers. Protein, as well as, antibodies directed against the protein may show utility as a tumor marker and/or immunotherapy targets for the above listed tissues.

Many polynucleotide sequences, such as EST sequences, are publicly available and accessible through sequence databases. Some of these sequences are related to SEQ ID NO:107 and may have been publicly available prior to conception of the present invention. Preferably, such related polynucleotides are specifically excluded from the scope of the present invention. To list every related sequence is cumbersome. Accordingly, preferably excluded from the present invention are one or more polynucleotides comprising a nucleotide sequence described by the general formula of a-b, where a is any integer between 1 to 807 of SEQ ID NO:107, b is an integer of 15 to 821, where both a and b correspond to the positions of nucleotide residues shown in SEQ ID NO:107, and where b is greater than or equal to a + 14.

Gene No.	cDNA Clone ID	ATCC Deposit Nr and Date	Vector	NT SEQ ID NO: X	Total NT Seq.	5' NT of Clone Seq.	3' NT of Clone Seq.	5' NT of Start Codon	5' NT of First AA of Signal Pep	AA SEQ ID NO: Y	First AA of Sig Pep	Last AA of Sig Pep	First AA of Secreted Portion	Last AA of ORF
1	HKABZ65	209683 03/20/98	pCMVSPORT 2.0	11	1191	1	1191	69	69	111	1	17	18	243
2	HNGIC80	209683 03/20/98	Uni-ZAP XR	12	1251	1	1251	24	24	112	1	24	25	41
3	HDPUG50	209745 04/07/98	pCMVSPORT 3.0	13	1734	1	1734	22	22	113	1	34	35	526
4	HAEAB66	209745 04/07/98	pBluescript SK-	14	1540	914	1537	105	105	114	1	30	31	354
5	HHEPF59	209746 04/07/98	pCMVSPORT 3.0	15	1558	1	1558	38	38	115	1	21	22	63
6	HE9BK23	209683 03/20/98	Uni-ZAP XR	16	1636	1	1636	39	39	116	1	21	22	309
7	HCYBI36	209683 03/20/98	pBluescript SK-	17	1256	148	1256	235	235	117	1	23	24	211
8	HSSDX51	209683 03/20/98	Uni-ZAP XR	18	1143	1	1143	133	133	118	1	20	21	50
9	HSDAJ46	209746 04/07/98	Uni-ZAP XR	19	1537	92	1537	299	299	119	1	18	19	262
10	HRACG45	209745 04/07/98	pCMVSPORT 3.0	20	2672	222	2672	178	178	120	1	42	43	270
11	HAPPW30	209683 03/20/98	Uni-ZAP XR	21	1508	14	1501	54	54	121	1	22	23	91

Gene No.	cDNA Clone ID	ATCC Deposit Nr and Date	Vector	NT SEQ ID NO: X	Total NT Seq.	5' NT of Clone Seq.	3' NT of Clone Seq.	5' NT of Start Codon	5' NT of First AA of Signal Pep	AA SEQ ID NO: Y	First AA of Sig Pep	Last AA of Sig Pep	First AA of Secreted Portion	Last AA of ORF
12	HE2ES51	209745 04/07/98	Uni-ZAP XR	22	1447	1	1447	77	77	122	1	14	15	222
13	HTXDW56	209746 04/07/98	Uni-ZAP XR	23	1583	1	1583	217	217	123	1	22	23	201
14	HEEAG23	209745 04/07/98	Uni-ZAP XR	24	1669	25	1280	57	57	124	1	18	19	46
15	HDPKJ93	209745 04/07/98	pCMVSPORT 3.0	25	1053	1	1053	46	46	125	1	21	22	305
16	HDLAC10	209745 04/07/98	pCMVSPORT 2.0	26	1477	1	1477	132	132	126	1	29	30	81
17	HDPOH06	209745 04/07/98	pCMVSPORT 3.0	27	2504	1	2504	252	252	127	1	29	30	242
18	HCE4G61	209745 04/07/98	Uni-ZAP XR	28	1866	1	1866	130	130	128	1	23	24	285
18	HCE4G61	209745 04/07/98	Uni-ZAP XR	108	1779	1	1720	125	125	208	1	20	21	81
19	HCWUI13	209745 04/07/98	ZAP Express	29	1501	1	1501	80	80	129	1	18	19	157
20	HDPSP01	209745 04/07/98	pCMVSPORT 3.0	30	1752	1	1752	227	227	130	1	20	21	308
21	HHPEN62	209746 04/07/98	Uni-ZAP XR	31	2152	141	2152	183	183	131	1	27	28	508

Gene No.	cDNA Clone ID	ATCC Deposit Nr and Date	Vector	NT SEQ ID NO: X	Total NT Seq.	5' NT of Clone Seq.	3' NT of Clone Seq.	5' NT of Start Codon	5' NT of First AA of Signal Pep	AA SEQ ID NO: Y	First AA of Sig Pep	Last AA of Sig Pep	First AA of Secreted Portion	Last AA of ORF
22	HUKBT29	209746 04/07/98	Lambda ZAP II	32	1757	56	1757	74	74	132	1	19	20	506
23	HMAJR50	209683 03/20/98	Uni-ZAP XR	33	1466	32	1466	70	70	133	1	21	22	48
24	HBIMB51	209683 03/20/98	pCMVSPORT 3.0	34	526	1	526	93	93	134	1	21	22	130
25	HE8DX88	209683 03/20/98	Uni-ZAP XR	35	2412	1	2412	256	256	135	1	29	30	43
26	HNGHT03	209746 04/07/98	Uni-ZAP XR	36	1274	65	1274	305	305	136	1	24	25	91
27	HWABU17	209745 04/07/98	pCMVSPORT 3.0	37	1036	1	1036	202	202	137	1	18	19	266
28	HDTAT90	209746 04/07/98	pCMVSPORT 2.0	38	1379	8	1379	78	78	138	1	26	27	434
29	HHFGR93	209746 04/07/98	Uni-ZAP XR	39	1932	1	1836	130	130	139	1	29	30	236
30	HOVCB25	209746 04/07/98	pSport1	40	1430	1	1430	150	150	140	1	18	19	99
31	HSYAV66	209746 04/07/98	pCMVSPORT 3.0	41	1407	1	1407	186	186	141	1	28	29	69
32	HFPCT29	209683 03/20/98	Uni-ZAP XR	42	950	1	950	268	268	142	1	26	27	61

Gene No.	cDNA Clone ID	ATCC Deposit Nr and Date	Vector	NT SEQ ID NO: X	Total NT Seq.	5' NT of Clone Seq.	3' NT of Clone Seq.	5' NT of Start Codon	5' NT of First AA of Signal Pep	AA SEQ ID NO: Y	First AA of Sig Pep	Last AA of Sig Pep	First AA of Secreted Portion	Last AA of ORF
33	HAWAT25	209683 03/20/98	pBluescript SK-	43	1004	56	1004	149	149	143	1	32	33	88
34	HNHR04	209683 03/20/98	Uni-ZAP XR	44	1681	1	1681	71	71	144	1	21	22	78
35	HOSFT61	209683 03/20/98	Uni-ZAP XR	45	1365	1	1365	211	211	145	1	21	22	90
36	HBJO81	209683 03/20/98	Uni-ZAP XR	46	1137	1	1137	220	220	146	1	23	24	68
37	HADCL55	209745 04/07/98	pSport1	47	2763	15	2763	60	60	147	1	29	30	43
38	HAGGJ80	209745 04/07/98	Uni-ZAP XR	48	1576	1	1576	40	40	148	1	34	35	84
39	HAIBO81	209745 04/07/98	Uni-ZAP XR	49	1348	1	1348	250	250	149	1	18	19	63
40	HBBBC37	209745 04/07/98	pCMVSPORT1	50	1264	1	1264	81	81	150	1	17	18	61
41	HBJMX85	209745 04/07/98	Uni-ZAP XR	51	1660	39	1660	45	45	151	1	18	19	82
42	HCEES66	209745 04/07/98	Uni-ZAP XR	52	1678	1	1678	178	178	152	1	39	40	46
43	HCEMP62	209745 04/07/98	Uni-ZAP XR	53	1860	269	1726	352	352	153	1	30	31	187

Gene No.	cDNA Clone ID	ATCC Deposit Nr and Date	Vector	NT SEQ ID NO: X	Total NT Seq.	5' NT of Clone Seq.	3' NT of Clone Seq.	5' NT of Start Codon	5' NT of First AA of Signal Pep	AA SEQ ID NO: Y	First AA of Sig Pep	Last AA of Sig Pep	First AA of Secreted Portion	Last AA of ORF
44	HE2FB90	209746 04/07/98	Uni-ZAP XR	54	1663	1	1663	205	205	154	1	27	28	113
45	HTHDJ94	209746 04/07/98	Uni-ZAP XR	55	1632	20	1632	66	66	155	1	26	27	292
46	HTOHJ89	209746 04/07/98	Uni-ZAP XR	56	2233	1	2233	42	42	156	1	17	18	86
47	HUSHB62	209745 04/07/98	Lambda ZAP II	57	1963	1	1760	130	130	157	1	49	50	106
48	HSXAG02	209683 03/20/98	Uni-ZAP XR	58	1267	411	1243	600	600	158	1	22	23	58
49	HHTLH52	209683 03/20/98	ZAP Express	59	1295	1	1295	218	218	159	1	22	23	40
50	HCFMS95	209683 03/20/98	pSport1	60	915	1	915	123	123	160	1	22	23	65
51	HOUCT90	209683 03/20/98	Uni-ZAP XR	61	1445	1	1445	74	74	161	1	30	31	46
52	HCFLR78	209745 04/07/98	pSport1	62	1100	224	1100	475	475	162	1	16	17	140
53	HTOHT18	209745 04/07/98	Uni-ZAP XR	63	1499	267	1499	433	433	163	1	24	25	53
54	HKPMB11	209745 04/07/98	pBluescript	64	655	1	655	55	55	164	1	25	26	167

Gene No.	cDNA Clone ID	ATCC Deposit Nr and Date	Vector	NT SEQ ID NO: X	Total NT Seq.	5' NT of Clone Seq.	3' NT of Clone Seq.	5' NT of Start Codon	5' NT of First AA of Signal Pep	AA SEQ ID NO: Y	First AA of Sig Pep	Last AA of Sig Pep	First AA of Secreted Portion	Last AA of ORF
55	HNFS38	209745 04/07/98	Uni-ZAP XR	65	1446	1	1446	171	171	165	1	18	19	62
56	HAIBU10	209745 04/07/98	Uni-ZAP XR	66	670	1	669	201	201	166	1	20	21	113
57	HAPOK30	209745 04/07/98	Uni-ZAP XR	67	1692	1	1692	300	300	167	1	19	20	61
58	HCEEM18	209745 04/07/98	Uni-ZAP XR	68	655	18	655	157	157	168	1	30	31	41
59	HCWUA22	209745 04/07/98	ZAP Express	69	1618	48	1618	233	233	169	1	33	34	42
60	HDSAG91	209745 04/07/98	Uni-ZAP XR	70	1802	1	1802	156	156	170	1	23	24	47
61	HNEDJ35	209746 04/07/98	Uni-ZAP XR	71	1292	1	1292	71	71	171	1	36	37	50
62	HTHBH29	209746 04/07/98	Uni-ZAP XR	72	1054	1	1054	52	52	172	1	24	25	56
63	H7TBA62	209745 04/07/98	PCR II	73	733	9	718	224	224	173	1	36	37	170
64	HNGIO50	209746 04/07/98	Uni-ZAP XR	74	785	1	785	132	132	174	1	27	28	44
65	HMIW81	209683 03/20/98	Uni-ZAP XR	75	2341	1	2215	229	229	175	1	17	18	46

Gene No.	cDNA Clone ID	ATCC Deposit Nr and Date	Vector	NT SEQ ID NO: X	Total NT Seq.	5' NT of Clone Seq.	3' NT of Clone Seq.	5' NT of Start Codon	5' NT of First AA of Signal Pep	AA SEQ ID NO: Y	First AA of Sig Pep	Last AA of Sig Pep	First AA of Secreted Portion	Last AA of ORF
66	HMMCJ60	209683 03/20/98	pSport1	76	1882	1	1882	132	132	176	1	16	17	41
67	HDPIO09	209745 04/07/98	pCMVSPORT 3.0	77	2892	17	2892	85	85	177	1	36	37	47
68	HHFHH34	209745 04/07/98	Uni-ZAP XR	78	1673	1	1673	16	16	178	1	22	23	70
69	HISCL83	209745 04/07/98	pSport1	79	1461	1	1461	259	259	179	1	21	22	41
70	HTOAI70	209746 04/07/98	Uni-ZAP XR	80	1517	1	1517	190	190	180	1	19	20	92
70	HTOAI70	209746 04/07/98	Uni-ZAP XR	109	1518	1	1518	190	190	209	1	19	20	42
71	HSDER95	209683 03/20/98	Uni-ZAP XR	81	574	1	574	72	72	181	1	25	26	71
72	HNECL25	209683 03/20/98	Uni-ZAP XR	82	1455	1	1455	322	322	182	1	32	33	66
73	HNFGZ45	209683 03/20/98	Uni-ZAP XR	83	1640	1	1640	450	450	183	1	38	39	70
74	HHGCU49	209745 04/07/98	Lambda ZAP II	84	525	1	525	173	173	184	1	23	24	40
75	HDPND68	209745 04/07/98	pCMVSPORT 3.0	85	837	1	837	154	154	185	1	17	18	66

Gene No.	cDNA Clone ID	ATCC Deposit Nr and Date	Vector	NT SEQ ID NO: X	Total NT Seq.	5' NT of Clone Seq.	3' NT of Clone Seq.	5' NT of Start Codon	5' NT of First AA of Signal Pep	AA SEQ ID NO: Y	First AA of Sig Pep	Last AA of Sig Pep	First AA of Secreted Portion	Last AA of ORF
76	HETDT81	209746 04/07/98	Uni-ZAP XR	86	1574	1	1574	189	189	186	1	25	26	66
77	HHLBA14	209746 04/07/98	pBluescript SK-	87	1628	353	1627	546	546	187	1	24	25	48
78	HLTBU43	209746 04/07/98	Uni-ZAP XR	88	1795	1	1795	198	198	188	1	19	20	66
79	HNTSJ84	209746 04/07/98	pSport1	89	1864	239	1864	336	336	189	1	22	23	57
80	HOHCG16	209746 04/07/98	pCMVSPORT 2.0	90	1983	1	1983	257	257	190	1	18	19	52
81	HTHCB31	209746 04/07/98	Uni-ZAP XR	91	1957	1	1957	46	46	191	1	17	18	43
82	HUKAM16	209746 04/07/98	Lambda ZAP II	92	573	1	573	178	178	192	1	23	24	52
83	HLDOJ66	209683 03/20/98	pCMVSPORT 3.0	93	1212	1	1212	313	313	193	1	20	21	40
84	HTXKF10	209683 03/20/98	Uni-ZAP XR	94	1144	1	1144	334	334	194	1	32	33	71
85	HPMAI22	209683 03/20/98	Uni-ZAP XR	95	1274	334	1274	483	483	195	1	16	17	59
86	HL2AG57	209746 04/07/98	Uni-ZAP XR	96	1780	349	1780	560	560	196	1	31	32	80

Gene No.	cDNA Clone ID	ATCC Deposit Nr and Date	Vector	NT SEQ ID NO: X	Total NT Seq.	5' NT of Clone Seq.	3' NT of Clone Seq.	5' NT of Start Codon	5' NT of First AA of Signal Pep	AA SEQ ID NO: Y	First AA of Sig Pep	Last AA of Sig Pep	First AA of Secreted Portion	Last AA of ORF
87	HUSAM59	209683 03/20/98	Lambda ZAP II	97	2065	1	2065	475	475	197	1	17	18	78
88	HNGGR26	209745 04/07/98	Uni-ZAP XR	98	1154	1	1154	50	50	198	1	27	28	115
89	HTLCX30	209683 03/20/98	Uni-ZAP XR	99	615	1	459	60	60	199	1	28	29	50
90	HCEBC87	209683 03/20/98	Uni-ZAP XR	100	1624	243	1624	517	517	200	1	23	24	57
91	HATCB92	209683 03/20/98	Uni-ZAP XR	101	1756	1	1756	247	247	201	1	40	41	56
92	HMSCX69	209746 04/07/98	Uni-ZAP XR	102	1416	207	1416	246	246	202	1	16	17	49
93	HLHAL68	209746 04/07/98	Uni-ZAP XR	103	704	1	704	30	30	203	1	21	22	44
94	HEOMR73	209746 04/07/98	pSport1	104	1259	644	1259	354	354	204	1	24	25	44
95	HETIB83	209746 04/07/98	Uni-ZAP XR	105	1804	1	1804	104	104	205	1	30	31	160
96	HJPDD28	209746 04/07/98	Uni-ZAP XR	106	971	260	971	283	283	206	1	21	22	198
96	HJPDD28	209746 04/07/98	Uni-ZAP XR	110	921	1	921	31	31	210	1	21	22	96

Gene No.	cDNA Clone ID	ATCC Deposit Nr and Date	Vector	NT SEQ ID NO: X	Total NT Seq.	5' NT of Clone Seq.	3' NT of Clone Seq.	5' NT of Start Codon	5' NT of AA of Signal Pep	AA SEQ ID NO: Y	First AA of Sig Pep	Last AA of Sig Pep	First AA of Secreted Portion	Last AA of ORF
97	HBAMB15	209683 03/20/98	pSport1	107	821	330	821	390	390	207	1	19	20	59

Table 1 summarizes the information corresponding to each "Gene No." described above. The nucleotide sequence identified as "NT SEQ ID NO:X" was assembled from partially homologous ("overlapping") sequences obtained from the "cDNA clone ID" identified in Table 1 and, in some cases, from additional related DNA clones. The overlapping sequences were assembled into a single contiguous sequence of high redundancy (usually three to five overlapping sequences at each nucleotide position), resulting in a final sequence identified as SEQ ID NO:X.

The cDNA Clone ID was deposited on the date and given the corresponding deposit number listed in "ATCC Deposit No:Z and Date." Some of the deposits contain multiple different clones corresponding to the same gene. "Vector" refers to the type of vector contained in the cDNA Clone ID.

"Total NT Seq." refers to the total number of nucleotides in the contig identified by "Gene No." The deposited clone may contain all or most of these sequences, reflected by the nucleotide position indicated as "5' NT of Clone Seq." and the "3' NT of Clone Seq." of SEQ ID NO:X. The nucleotide position of SEQ ID NO:X of the putative start codon (methionine) is identified as "5' NT of Start Codon." Similarly, the nucleotide position of SEQ ID NO:X of the predicted signal sequence is identified as "5' NT of First AA of Signal Pep."

The translated amino acid sequence, beginning with the methionine, is identified as "AA SEQ ID NO:Y," although other reading frames can also be easily translated using known molecular biology techniques. The polypeptides produced by these alternative open reading frames are specifically contemplated by the present invention.

The first and last amino acid position of SEQ ID NO:Y of the predicted signal peptide is identified as "First AA of Sig Pep" and "Last AA of Sig Pep." The predicted first amino acid position of SEQ ID NO:Y of the secreted portion is identified as "Predicted First AA of Secreted Portion." Finally, the amino acid position of SEQ ID NO:Y of the last amino acid in the open reading frame is identified as "Last AA of ORF."

SEQ ID NO:X and the translated SEQ ID NO:Y are sufficiently accurate and otherwise suitable for a variety of uses well known in the art and described further below. For instance, SEQ ID NO:X is useful for designing nucleic acid hybridization

probes that will detect nucleic acid sequences contained in SEQ ID NO:X or the cDNA contained in the deposited clone. These probes will also hybridize to nucleic acid molecules in biological samples, thereby enabling a variety of forensic and diagnostic methods of the invention. Similarly, polypeptides identified from SEQ ID
5 NO:Y may be used to generate antibodies which bind specifically to the secreted proteins encoded by the cDNA clones identified in Table 1.

Nevertheless, DNA sequences generated by sequencing reactions can contain sequencing errors. The errors exist as misidentified nucleotides, or as insertions or deletions of nucleotides in the generated DNA sequence. The erroneously inserted or
10 deleted nucleotides cause frame shifts in the reading frames of the predicted amino acid sequence. In these cases, the predicted amino acid sequence diverges from the actual amino acid sequence, even though the generated DNA sequence may be greater than 99.9% identical to the actual DNA sequence (for example, one base insertion or deletion in an open reading frame of over 1000 bases).

15 Accordingly, for those applications requiring precision in the nucleotide sequence or the amino acid sequence, the present invention provides not only the generated nucleotide sequence identified as SEQ ID NO:X and the predicted translated amino acid sequence identified as SEQ ID NO:Y, but also a sample of plasmid DNA containing a human cDNA of the invention deposited with the ATCC,
20 as set forth in Table 1. The nucleotide sequence of each deposited clone can readily be determined by sequencing the deposited clone in accordance with known methods. The predicted amino acid sequence can then be verified from such deposits. Moreover, the amino acid sequence of the protein encoded by a particular clone can also be directly determined by peptide sequencing or by expressing the protein in a
25 suitable host cell containing the deposited human cDNA, collecting the protein, and determining its sequence.

The present invention also relates to the genes corresponding to SEQ ID NO:X, SEQ ID NO:Y, or the deposited clone. The corresponding gene can be isolated in accordance with known methods using the sequence information disclosed
30 herein. Such methods include preparing probes or primers from the disclosed sequence and identifying or amplifying the corresponding gene from appropriate sources of genomic material.

Also provided in the present invention are species homologs. Species homologs may be isolated and identified by making suitable probes or primers from the sequences provided herein and screening a suitable nucleic acid source for the desired homologue.

5 The polypeptides of the invention can be prepared in any suitable manner. Such polypeptides include isolated naturally occurring polypeptides, recombinantly produced polypeptides, synthetically produced polypeptides, or polypeptides produced by a combination of these methods. Means for preparing such polypeptides are well understood in the art.

10 The polypeptides may be in the form of the secreted protein, including the mature form, or may be a part of a larger protein, such as a fusion protein (see below). It is often advantageous to include an additional amino acid sequence which contains secretory or leader sequences, pro-sequences, sequences which aid in purification , such as multiple histidine residues, or an additional sequence for stability during
15 recombinant production.

 The polypeptides of the present invention are preferably provided in an isolated form, and preferably are substantially purified. A recombinantly produced version of a polypeptide, including the secreted polypeptide, can be substantially purified by the one-step method described in Smith and Johnson, Gene 67:31-40
20 (1988). Polypeptides of the invention also can be purified from natural or recombinant sources using antibodies of the invention raised against the secreted protein in methods which are well known in the art.

Signal Sequences

25 Methods for predicting whether a protein has a signal sequence, as well as the cleavage point for that sequence, are available. For instance, the method of McGeoch, Virus Res. 3:271-286 (1985), uses the information from a short N-terminal charged region and a subsequent uncharged region of the complete (uncleaved) protein. The method of von Heinje, Nucleic Acids Res. 14:4683-4690 (1986) uses the
30 information from the residues surrounding the cleavage site, typically residues -13 to +2, where +1 indicates the amino terminus of the secreted protein. The accuracy of predicting the cleavage points of known mammalian secretory proteins for each of

these methods is in the range of 75-80%. (von Heinje, supra.) However, the two methods do not always produce the same predicted cleavage point(s) for a given protein.

In the present case, the deduced amino acid sequence of the secreted polypeptide was analyzed by a computer program called SignalP (Henrik Nielsen et al., Protein Engineering 10:1-6 (1997)), which predicts the cellular location of a protein based on the amino acid sequence. As part of this computational prediction of localization, the methods of McGeoch and von Heinje are incorporated. The analysis of the amino acid sequences of the secreted proteins described herein by this program provided the results shown in Table 1.

As one of ordinary skill would appreciate, however, cleavage sites sometimes vary from organism to organism and cannot be predicted with absolute certainty. Accordingly, the present invention provides secreted polypeptides having a sequence shown in SEQ ID NO:Y which have an N-terminus beginning within 5 residues (i.e., + or - 5 residues) of the predicted cleavage point. Similarly, it is also recognized that in some cases, cleavage of the signal sequence from a secreted protein is not entirely uniform, resulting in more than one secreted species. These polypeptides, and the polynucleotides encoding such polypeptides, are contemplated by the present invention.

Moreover, the signal sequence identified by the above analysis may not necessarily predict the naturally occurring signal sequence. For example, the naturally occurring signal sequence may be further upstream from the predicted signal sequence. However, it is likely that the predicted signal sequence will be capable of directing the secreted protein to the ER. These polypeptides, and the polynucleotides encoding such polypeptides, are contemplated by the present invention.

Polynucleotide and Polypeptide Variants

"Variant" refers to a polynucleotide or polypeptide differing from the polynucleotide or polypeptide of the present invention, but retaining essential properties thereof. Generally, variants are overall closely similar, and, in many regions, identical to the polynucleotide or polypeptide of the present invention.

By a polynucleotide having a nucleotide sequence at least, for example, 95%

"identical" to a reference nucleotide sequence of the present invention, it is intended that the nucleotide sequence of the polynucleotide is identical to the reference sequence except that the polynucleotide sequence may include up to five point mutations per each 100 nucleotides of the reference nucleotide sequence encoding the polypeptide. In other words, to obtain a polynucleotide having a nucleotide sequence at least 95% identical to a reference nucleotide sequence, up to 5% of the nucleotides in the reference sequence may be deleted or substituted with another nucleotide, or a number of nucleotides up to 5% of the total nucleotides in the reference sequence may be inserted into the reference sequence. The query sequence may be an entire sequence shown in Table 1, the ORF (open reading frame), or any fragement specified as described herein.

As a practical matter, whether any particular nucleic acid molecule or polypeptide is at least 90%, 95%, 96%, 97%, 98% or 99% identical to a nucleotide sequence of the present invention can be determined conventionally using known computer programs. A preferred method for determining the best overall match between a query sequence (a sequence of the present invention) and a subject sequence, also referred to as a global sequence alignment, can be determined using the FASTDB computer program based on the algorithm of Brutlag et al. (Comp. App. Biosci. (1990) 6:237-245). In a sequence alignment the query and subject sequences are both DNA sequences. An RNA sequence can be compared by converting U's to T's. The result of said global sequence alignment is in percent identity. Preferred parameters used in a FASTDB alignment of DNA sequences to calculate percent identity are: Matrix=Unitary, k-tuple=4, Mismatch Penalty=1, Joining Penalty=30, Randomization Group Length=0, Cutoff Score=1, Gap Penalty=5, Gap Size Penalty 0.05, Window Size=500 or the length of the subject nucleotide sequence, whichever is shorter.

If the subject sequence is shorter than the query sequence because of 5' or 3' deletions, not because of internal deletions, a manual correction must be made to the results. This is because the FASTDB program does not account for 5' and 3' truncations of the subject sequence when calculating percent identity. For subject sequences truncated at the 5' or 3' ends, relative to the query sequence, the percent identity is corrected by calculating the number of bases of the query sequence

that are 5' and 3' of the subject sequence, which are not matched/aligned, as a percent of the total bases of the query sequence. Whether a nucleotide is matched/aligned is determined by results of the FASTDB sequence alignment. This percentage is then subtracted from the percent identity, calculated by the above FASTDB program using the specified parameters, to arrive at a final percent identity score. This corrected score is what is used for the purposes of the present invention. Only bases outside the 5' and 3' bases of the subject sequence, as displayed by the FASTDB alignment, which are not matched/aligned with the query sequence, are calculated for the purposes of manually adjusting the percent identity score.

For example, a 90 base subject sequence is aligned to a 100 base query sequence to determine percent identity. The deletions occur at the 5' end of the subject sequence and therefore, the FASTDB alignment does not show a matched/alignment of the first 10 bases at 5' end. The 10 unpaired bases represent 10% of the sequence (number of bases at the 5' and 3' ends not matched/total number of bases in the query sequence) so 10% is subtracted from the percent identity score calculated by the FASTDB program. If the remaining 90 bases were perfectly matched the final percent identity would be 90%. In another example, a 90 base subject sequence is compared with a 100 base query sequence. This time the deletions are internal deletions so that there are no bases on the 5' or 3' of the subject sequence which are not matched/aligned with the query. In this case the percent identity calculated by FASTDB is not manually corrected. Once again, only bases 5' and 3' of the subject sequence which are not matched/aligned with the query sequence are manually corrected for. No other manual corrections are to made for the purposes of the present invention.

By a polypeptide having an amino acid sequence at least, for example, 95% "identical" to a query amino acid sequence of the present invention, it is intended that the amino acid sequence of the subject polypeptide is identical to the query sequence except that the subject polypeptide sequence may include up to five amino acid alterations per each 100 amino acids of the query amino acid sequence. In other words, to obtain a polypeptide having an amino acid sequence at least 95% identical to a query amino acid sequence, up to 5% of the amino acid residues in the subject sequence may be inserted, deleted, (indels) or substituted with another amino acid.

These alterations of the reference sequence may occur at the amino or carboxy terminal positions of the reference amino acid sequence or anywhere between those terminal positions, interspersed either individually among residues in the reference sequence or in one or more contiguous groups within the reference sequence.

- 5 As a practical matter, whether any particular polypeptide is at least 90%, 95%, 96%, 97%, 98% or 99% identical to, for instance, the amino acid sequences shown in Table 1 or to the amino acid sequence encoded by deposited DNA clone can be determined conventionally using known computer programs. A preferred method for determining the best overall match between a query sequence (a sequence of the present invention) and a subject sequence, also referred to as a global sequence alignment, can be determined using the FASTDB computer program based on the algorithm of Brutlag et al. (Comp. App. Biosci. (1990) 6:237-245). In a sequence alignment the query and subject sequences are either both nucleotide sequences or both amino acid sequences. The result of said global sequence alignment is in percent identity.
- 10 Preferred parameters used in a FASTDB amino acid alignment are: Matrix=PAM 0, k-tuple=2, Mismatch Penalty=1, Joining Penalty=20, Randomization Group Length=0, Cutoff Score=1, Window Size=sequence length, Gap Penalty=5, Gap Size Penalty=0.05, Window Size=500 or the length of the subject amino acid sequence, whichever is shorter.
- 15 If the subject sequence is shorter than the query sequence due to N- or C-terminal deletions, not because of internal deletions, a manual correction must be made to the results. This is because the FASTDB program does not account for N- and C-terminal truncations of the subject sequence when calculating global percent identity. For subject sequences truncated at the N- and C-termini, relative to the query sequence, the percent identity is corrected by calculating the number of residues of the query sequence that are N- and C-terminal of the subject sequence, which are not matched/aligned with a corresponding subject residue, as a percent of the total bases of the query sequence. Whether a residue is matched/aligned is determined by results of the FASTDB sequence alignment. This percentage is then subtracted from the percent identity, calculated by the above FASTDB program using the specified parameters, to arrive at a final percent identity score. This final percent identity score is what is used for the purposes of the present invention. Only residues to the N- and
- 20
- 25
- 30

C-termini of the subject sequence, which are not matched/aligned with the query sequence, are considered for the purposes of manually adjusting the percent identity score. That is, only query residue positions outside the farthest N- and C-terminal residues of the subject sequence.

5 For example, a 90 amino acid residue subject sequence is aligned with a 100 residue query sequence to determine percent identity. The deletion occurs at the N-terminus of the subject sequence and therefore, the FASTDB alignment does not show a matching/alignment of the first 10 residues at the N-terminus. The 10 unpaired residues represent 10% of the sequence (number of residues at the N- and C-termini not matched/total number of residues in the query sequence) so 10% is subtracted from the percent identity score calculated by the FASTDB program. If the remaining 90 residues were perfectly matched the final percent identity would be 90%. In another example, a 90 residue subject sequence is compared with a 100 residue query sequence. This time the deletions are internal deletions so there are no residues at the N- or C-termini of the subject sequence which are not matched/aligned with the query. In this case the percent identity calculated by FASTDB is not manually corrected. Once again, only residue positions outside the N- and C-terminal ends of the subject sequence, as displayed in the FASTDB alignment, which are not matched/aligned with the query sequence are manually corrected for. No other manual corrections are to be made for the purposes of the present invention.

20 The variants may contain alterations in the coding regions, non-coding regions, or both. Especially preferred are polynucleotide variants containing alterations which produce silent substitutions, additions, or deletions, but do not alter the properties or activities of the encoded polypeptide. Nucleotide variants produced by silent substitutions due to the degeneracy of the genetic code are preferred. Moreover, variants in which 5-10, 1-5, or 1-2 amino acids are substituted, deleted, or added in any combination are also preferred. Polynucleotide variants can be produced for a variety of reasons, e.g., to optimize codon expression for a particular host (change codons in the human mRNA to those preferred by a bacterial host such as E. coli).

30 Naturally occurring variants are called "allelic variants," and refer to one of several alternate forms of a gene occupying a given locus on a chromosome of an

organism. (Genes II, Lewin, B., ed., John Wiley & Sons, New York (1985).) These allelic variants can vary at either the polynucleotide and/or polypeptide level. Alternatively, non-naturally occurring variants may be produced by mutagenesis techniques or by direct synthesis.

5 Using known methods of protein engineering and recombinant DNA technology, variants may be generated to improve or alter the characteristics of the polypeptides of the present invention. For instance, one or more amino acids can be deleted from the N-terminus or C-terminus of the secreted protein without substantial loss of biological function. The authors of Ron et al., J. Biol. Chem. 268: 2984-2988
10 (1993), reported variant KGF proteins having heparin binding activity even after deleting 3, 8, or 27 amino-terminal amino acid residues. Similarly, Interferon gamma exhibited up to ten times higher activity after deleting 8-10 amino acid residues from the carboxy terminus of this protein. (Dobeli et al., J. Biotechnology 7:199-216 (1988).)

15 Moreover, ample evidence demonstrates that variants often retain a biological activity similar to that of the naturally occurring protein. For example, Gayle and coworkers (J. Biol. Chem 268:22105-22111 (1993)) conducted extensive mutational analysis of human cytokine IL-1a. They used random mutagenesis to generate over 3,500 individual IL-1a mutants that averaged 2.5 amino acid changes per variant over
20 the entire length of the molecule. Multiple mutations were examined at every possible amino acid position. The investigators found that "[m]ost of the molecule could be altered with little effect on either [binding or biological activity]." (See, Abstract.) In fact, only 23 unique amino acid sequences, out of more than 3,500 nucleotide sequences examined, produced a protein that significantly differed in
25 activity from wild-type.

 Furthermore, even if deleting one or more amino acids from the N-terminus or C-terminus of a polypeptide results in modification or loss of one or more biological functions, other biological activities may still be retained. For example, the ability of a deletion variant to induce and/or to bind antibodies which recognize the secreted
30 form will likely be retained when less than the majority of the residues of the secreted form are removed from the N-terminus or C-terminus. Whether a particular polypeptide lacking N- or C-terminal residues of a protein retains such immunogenic

activities can readily be determined by routine methods described herein and otherwise known in the art.

Thus, the invention further includes polypeptide variants which show substantial biological activity. Such variants include deletions, insertions, 5 inversions, repeats, and substitutions selected according to general rules known in the art so as have little effect on activity. For example, guidance concerning how to make phenotypically silent amino acid substitutions is provided in Bowie, J. U. et al., Science 247:1306-1310 (1990), wherein the authors indicate that there are two main strategies for studying the tolerance of an amino acid sequence to change.

10 The first strategy exploits the tolerance of amino acid substitutions by natural selection during the process of evolution. By comparing amino acid sequences in different species, conserved amino acids can be identified. These conserved amino acids are likely important for protein function. In contrast, the amino acid positions where substitutions have been tolerated by natural selection indicates that these 15 positions are not critical for protein function. Thus, positions tolerating amino acid substitution could be modified while still maintaining biological activity of the protein.

The second strategy uses genetic engineering to introduce amino acid changes at specific positions of a cloned gene to identify regions critical for protein function. 20 For example, site directed mutagenesis or alanine-scanning mutagenesis (introduction of single alanine mutations at every residue in the molecule) can be used. (Cunningham and Wells, Science 244:1081-1085 (1989).) The resulting mutant molecules can then be tested for biological activity.

As the authors state, these two strategies have revealed that proteins are 25 surprisingly tolerant of amino acid substitutions. The authors further indicate which amino acid changes are likely to be permissive at certain amino acid positions in the protein. For example, most buried (within the tertiary structure of the protein) amino acid residues require nonpolar side chains, whereas few features of surface side chains are generally conserved. Moreover, tolerated conservative amino acid substitutions 30 involve replacement of the aliphatic or hydrophobic amino acids Ala, Val, Leu and Ile; replacement of the hydroxyl residues Ser and Thr; replacement of the acidic residues Asp and Glu; replacement of the amide residues Asn and Gln, replacement of

the basic residues Lys, Arg, and His; replacement of the aromatic residues Phe, Tyr, and Trp, and replacement of the small-sized amino acids Ala, Ser, Thr, Met, and Gly.

Besides conservative amino acid substitution, variants of the present invention
5 include (i) substitutions with one or more of the non-conserved amino acid residues, where the substituted amino acid residues may or may not be one encoded by the genetic code, or (ii) substitution with one or more of amino acid residues having a . substituent group, or (iii) fusion of the mature polypeptide with another compound, such as a compound to increase the stability and/or solubility of the polypeptide (for
10 example, polyethylene glycol), or (iv) fusion of the polypeptide with additional amino acids, such as an IgG Fc fusion region peptide, or leader or secretory sequence, or a sequence facilitating purification. Such variant polypeptides are deemed to be within the scope of those skilled in the art from the teachings herein.

For example, polypeptide variants containing amino acid substitutions of
15 charged amino acids with other charged or neutral amino acids may produce proteins with improved characteristics, such as less aggregation. Aggregation of pharmaceutical formulations both reduces activity and increases clearance due to the aggregate's immunogenic activity. (Pinckard et al., Clin. Exp. Immunol. 2:331-340 (1967); Robbins et al., Diabetes 36: 838-845 (1987); Cleland et al., Crit. Rev.
20 Therapeutic Drug Carrier Systems 10:307-377 (1993).)

A further embodiment of the invention relates to a polypeptide which comprises the amino acid sequence of the present invention having an amino acid sequence which contains at least one amino acid substitution, but not more than 50 amino acid substitutions, even more preferably, not more than 40 amino acid
25 substitutions, still more preferably, not more than 30 amino acid substitutions, and still even more preferably, not more than 20 amino acid substitutions. Of course, in order of ever-increasing preference, it is highly preferable for a polypeptide to have an amino acid sequence which comprises the amino acid sequence of the present invention, which contains at least one, but not more than 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1
30 amino acid substitutions. In specific embodiments, the number of additions, substitutions, and/or deletions in the amino acid sequence of the present invention or fragments thereof (e.g., the mature form and/or other fragments described herein), is

1-5, 5-10, 5-25, 5-50, 10-50 or 50-150, conservative amino acid substitutions are preferable.

Polynucleotide and Polypeptide Fragments

5 In the present invention, a "polynucleotide fragment" refers to a short polynucleotide having a nucleic acid sequence contained in the deposited clone or shown in SEQ ID NO:X. The short nucleotide fragments are preferably at least about 15 nt, and more preferably at least about 20 nt, still more preferably at least about 30 nt, and even more preferably, at least about 40 nt in length. A fragment "at least 20 nt
10 in length," for example, is intended to include 20 or more contiguous bases from the cDNA sequence contained in the deposited clone or the nucleotide sequence shown in SEQ ID NO:X. These nucleotide fragments are useful as diagnostic probes and primers as discussed herein. Of course, larger fragments (e.g., 50, 150, 500, 600, 2000 nucleotides) are preferred.

15 Moreover, representative examples of polynucleotide fragments of the invention, include, for example, fragments having a sequence from about nucleotide number 1-50, 51-100, 101-150, 151-200, 201-250, 251-300, 301-350, 351-400, 401-450, 451-500, 501-550, 551-600, 651-700, 701-750, 751-800, 800-850, 851-900, 901-950, 951-1000, 1001-1050, 1051-1100, 1101-1150, 1151-1200, 1201-1250, 1251-
20 1300, 1301-1350, 1351-1400, 1401-1450, 1451-1500, 1501-1550, 1551-1600, 1601-1650, 1651-1700, 1701-1750, 1751-1800, 1801-1850, 1851-1900, 1901-1950, 1951-2000, or 2001 to the end of SEQ ID NO:X or the cDNA contained in the deposited clone. In this context "about" includes the particularly recited ranges, larger or smaller by several (5, 4, 3, 2, or 1) nucleotides, at either terminus or at both termini.
25 Preferably, these fragments encode a polypeptide which has biological activity. More preferably, these polynucleotides can be used as probes or primers as discussed herein.

 In the present invention, a "polypeptide fragment" refers to a short amino acid sequence contained in SEQ ID NO:Y or encoded by the cDNA contained in the
30 deposited clone. Protein fragments may be "free-standing," or comprised within a larger polypeptide of which the fragment forms a part or region, most preferably as a single continuous region. Representative examples of polypeptide fragments of the

invention, include, for example, fragments from about amino acid number 1-20, 21-40, 41-60, 61-80, 81-100, 102-120, 121-140, 141-160, or 161 to the end of the coding region. Moreover, polypeptide fragments can be about 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, or 150 amino acids in length. In this context "about" includes the particularly recited ranges, larger or smaller by several (5, 4, 3, 2, or 1) amino acids, at either extreme or at both extremes.

Preferred polypeptide fragments include the secreted protein as well as the mature form. Further preferred polypeptide fragments include the secreted protein or the mature form having a continuous series of deleted residues from the amino or the carboxy terminus, or both. For example, any number of amino acids, ranging from 1-60, can be deleted from the amino terminus of either the secreted polypeptide or the mature form. Similarly, any number of amino acids, ranging from 1-30, can be deleted from the carboxy terminus of the secreted protein or mature form. Furthermore, any combination of the above amino and carboxy terminus deletions are preferred. Similarly, polynucleotide fragments encoding these polypeptide fragments are also preferred.

Also preferred are polypeptide and polynucleotide fragments characterized by structural or functional domains, such as fragments that comprise alpha-helix and alpha-helix forming regions, beta-sheet and beta-sheet-forming regions, turn and turn-forming regions, coil and coil-forming regions, hydrophilic regions, hydrophobic regions, alpha amphipathic regions, beta amphipathic regions, flexible regions, surface-forming regions, substrate binding region, and high antigenic index regions. Polypeptide fragments of SEQ ID NO:Y falling within conserved domains are specifically contemplated by the present invention. Moreover, polynucleotide fragments encoding these domains are also contemplated.

Other preferred fragments are biologically active fragments. Biologically active fragments are those exhibiting activity similar, but not necessarily identical, to an activity of the polypeptide of the present invention. The biological activity of the fragments may include an improved desired activity, or a decreased undesirable activity.

Epitopes & Antibodies

In the present invention, "epitopes" refer to polypeptide fragments having antigenic or immunogenic activity in an animal, especially in a human. A preferred embodiment of the present invention relates to a polypeptide fragment comprising an epitope, as well as the polynucleotide encoding this fragment. A region of a protein molecule to which an antibody can bind is defined as an "antigenic epitope." In contrast, an "immunogenic epitope" is defined as a part of a protein that elicits an antibody response. (See, for instance, Geysen et al., Proc. Natl. Acad. Sci. USA 81:3998-4002 (1983).)

Fragments which function as epitopes may be produced by any conventional means. (See, e.g., Houghten, R. A., Proc. Natl. Acad. Sci. USA 82:5131-5135 (1985) further described in U.S. Patent No. 4,631,211.)

In the present invention, antigenic epitopes preferably contain a sequence of at least seven, more preferably at least nine, and most preferably between about 15 to about 30 amino acids. Antigenic epitopes are useful to raise antibodies, including monoclonal antibodies, that specifically bind the epitope. (See, for instance, Wilson et al., Cell 37:767-778 (1984); Sutcliffe, J. G. et al., Science 219:660-666 (1983).)

Similarly, immunogenic epitopes can be used to induce antibodies according to methods well known in the art. (See, for instance, Sutcliffe et al., supra; Wilson et al., supra; Chow, M. et al., Proc. Natl. Acad. Sci. USA 82:910-914; and Bittle, F. J. et al., J. Gen. Virol. 66:2347-2354 (1985).) A preferred immunogenic epitope includes the secreted protein. The immunogenic epitopes may be presented together with a carrier protein, such as an albumin, to an animal system (such as rabbit or mouse) or, if it is long enough (at least about 25 amino acids), without a carrier. However, immunogenic epitopes comprising as few as 8 to 10 amino acids have been shown to be sufficient to raise antibodies capable of binding to, at the very least, linear epitopes in a denatured polypeptide (e.g., in Western blotting.)

As used herein, the term "antibody" (Ab) or "monoclonal antibody" (Mab) is meant to include intact molecules as well as antibody fragments (such as, for example, Fab and F(ab')₂ fragments) which are capable of specifically binding to protein. Fab and F(ab')₂ fragments lack the Fc fragment of intact antibody, clear more rapidly from the circulation, and may have less non-specific tissue binding than an intact antibody. (Wahl et al., J. Nucl. Med. 24:316-325 (1983).) Thus, these

fragments are preferred, as well as the products of a FAB or other immunoglobulin expression library. Moreover, antibodies of the present invention include chimeric, single chain, and humanized antibodies.

5 **Fusion Proteins**

Any polypeptide of the present invention can be used to generate fusion proteins. For example, the polypeptide of the present invention, when fused to a second protein, can be used as an antigenic tag. Antibodies raised against the polypeptide of the present invention can be used to indirectly detect the second
10 protein by binding to the polypeptide. Moreover, because secreted proteins target cellular locations based on trafficking signals, the polypeptides of the present invention can be used as targeting molecules once fused to other proteins.

Examples of domains that can be fused to polypeptides of the present invention include not only heterologous signal sequences, but also other heterologous
15 functional regions. The fusion does not necessarily need to be direct, but may occur through linker sequences.

Moreover, fusion proteins may also be engineered to improve characteristics of the polypeptide of the present invention. For instance, a region of additional amino acids, particularly charged amino acids, may be added to the N-terminus of the
20 polypeptide to improve stability and persistence during purification from the host cell or subsequent handling and storage. Also, peptide moieties may be added to the polypeptide to facilitate purification. Such regions may be removed prior to final preparation of the polypeptide. The addition of peptide moieties to facilitate handling of polypeptides are familiar and routine techniques in the art.

Moreover, polypeptides of the present invention, including fragments, and specifically epitopes, can be combined with parts of the constant domain of immunoglobulins (IgG), resulting in chimeric polypeptides. These fusion proteins facilitate purification and show an increased half-life in vivo. One reported example describes chimeric proteins consisting of the first two domains of the human CD4-
25 polypeptide and various domains of the constant regions of the heavy or light chains of mammalian immunoglobulins. (EP A 394,827; Traunecker et al., Nature 331:84-86 (1988).) Fusion proteins having disulfide-linked dimeric structures (due to the
30

IgG) can also be more efficient in binding and neutralizing other molecules, than the monomeric secreted protein or protein fragment alone. (Fountoulakis et al., J. Biochem. 270:3958-3964 (1995).)

Similarly, EP-A-O 464 533 (Canadian counterpart 2045869) discloses fusion proteins comprising various portions of constant region of immunoglobulin molecules together with another human protein or part thereof. In many cases, the Fc part in a fusion protein is beneficial in therapy and diagnosis, and thus can result in, for example, improved pharmacokinetic properties. (EP-A 0232 262.) Alternatively, deleting the Fc part after the fusion protein has been expressed, detected, and purified, would be desired. For example, the Fc portion may hinder therapy and diagnosis if the fusion protein is used as an antigen for immunizations. In drug discovery, for example, human proteins, such as hIL-5, have been fused with Fc portions for the purpose of high-throughput screening assays to identify antagonists of hIL-5. (See, D. Bennett et al., J. Molecular Recognition 8:52-58 (1995); K. Johanson et al., J. Biol. Chem. 270:9459-9471 (1995).)

Moreover, the polypeptides of the present invention can be fused to marker sequences, such as a peptide which facilitates purification of the fused polypeptide. In preferred embodiments, the marker amino acid sequence is a hexa-histidine peptide, such as the tag provided in a pQE vector (QIAGEN, Inc., 9259 Eton Avenue, Chatsworth, CA, 91311), among others, many of which are commercially available. As described in Gentz et al., Proc. Natl. Acad. Sci. USA 86:821-824 (1989), for instance, hexa-histidine provides for convenient purification of the fusion protein. Another peptide tag useful for purification, the "HA" tag, corresponds to an epitope derived from the influenza hemagglutinin protein. (Wilson et al., Cell 37:767 (1984).)

Thus, any of these above fusions can be engineered using the polynucleotides or the polypeptides of the present invention.

Vectors, Host Cells, and Protein Production

The present invention also relates to vectors containing the polynucleotide of the present invention, host cells, and the production of polypeptides by recombinant techniques. The vector may be, for example, a phage, plasmid, viral, or retroviral

vector. Retroviral vectors may be replication competent or replication defective. In the latter case, viral propagation generally will occur only in complementing host cells.

5 The polynucleotides may be joined to a vector containing a selectable marker for propagation in a host. Generally, a plasmid vector is introduced in a precipitate, such as a calcium phosphate precipitate, or in a complex with a charged lipid. If the vector is a virus, it may be packaged in vitro using an appropriate packaging cell line and then transduced into host cells.

10 The polynucleotide insert should be operatively linked to an appropriate promoter, such as the phage lambda PL promoter, the E. coli lac, trp, phoA and tac promoters, the SV40 early and late promoters and promoters of retroviral LTRs, to name a few. Other suitable promoters will be known to the skilled artisan. The expression constructs will further contain sites for transcription initiation, termination, and, in the transcribed region, a ribosome binding site for translation. The coding
15 portion of the transcripts expressed by the constructs will preferably include a translation initiating codon at the beginning and a termination codon (UAA, UGA or UAG) appropriately positioned at the end of the polypeptide to be translated.

As indicated, the expression vectors will preferably include at least one selectable marker. Such markers include dihydrofolate reductase, G418 or neomycin
20 resistance for eukaryotic cell culture and tetracycline, kanamycin or ampicillin resistance genes for culturing in E. coli and other bacteria. Representative examples of appropriate hosts include, but are not limited to, bacterial cells, such as E. coli, Streptomyces and Salmonella typhimurium cells; fungal cells, such as yeast cells; insect cells such as Drosophila S2 and Spodoptera Sf9 cells; animal cells such as
25 CHO, COS, 293, and Bowes melanoma cells; and plant cells. Appropriate culture mediums and conditions for the above-described host cells are known in the art.

Among vectors preferred for use in bacteria include pQE70, pQE60 and pQE-
9, available from QIAGEN, Inc.; pBluescript vectors, Phagescript vectors, pNH8A, pNH16a, pNH18A, pNH46A, available from Stratagene Cloning Systems, Inc.; and
30 ptrc99a, pKK223-3, pKK233-3, pDR540, pRIT5 available from Pharmacia Biotech, Inc. Among preferred eukaryotic vectors are pWLNEO, pSV2CAT, pOG44, pXT1

and pSG available from Stratagene; and pSVK3, pBPV, pMSG and pSVL available from Pharmacia. Other suitable vectors will be readily apparent to the skilled artisan.

Introduction of the construct into the host cell can be effected by calcium phosphate transfection, DEAE-dextran mediated transfection, cationic lipid-mediated transfection, electroporation, transduction, infection, or other methods. Such methods are described in many standard laboratory manuals, such as Davis et al., Basic Methods In Molecular Biology (1986). It is specifically contemplated that the polypeptides of the present invention may in fact be expressed by a host cell lacking a recombinant vector.

A polypeptide of this invention can be recovered and purified from recombinant cell cultures by well-known methods including ammonium sulfate or ethanol precipitation, acid extraction, anion or cation exchange chromatography, phosphocellulose chromatography, hydrophobic interaction chromatography, affinity chromatography, hydroxylapatite chromatography and lectin chromatography. Most preferably, high performance liquid chromatography ("HPLC") is employed for purification.

Polypeptides of the present invention, and preferably the secreted form, can also be recovered from: products purified from natural sources, including bodily fluids, tissues and cells, whether directly isolated or cultured; products of chemical synthetic procedures; and products produced by recombinant techniques from a prokaryotic or eukaryotic host, including, for example, bacterial, yeast, higher plant, insect, and mammalian cells. Depending upon the host employed in a recombinant production procedure, the polypeptides of the present invention may be glycosylated or may be non-glycosylated. In addition, polypeptides of the invention may also include an initial modified methionine residue, in some cases as a result of host-mediated processes. Thus, it is well known in the art that the N-terminal methionine encoded by the translation initiation codon generally is removed with high efficiency from any protein after translation in all eukaryotic cells. While the N-terminal methionine on most proteins also is efficiently removed in most prokaryotes, for some proteins, this prokaryotic removal process is inefficient, depending on the nature of the amino acid to which the N-terminal methionine is covalently linked.

In addition to encompassing host cells containing the vector constructs discussed herein, the invention also encompasses primary, secondary, and immortalized host cells of vertebrate origin, particularly mammalian origin, that have been engineered to delete or replace endogenous genetic material (e.g., coding sequence), and/or to include genetic material (e.g., heterologous polynucleotide sequences) that is operably associated with the polynucleotides of the invention, and which activates, alters, and/or amplifies endogenous polynucleotides. For example, techniques known in the art may be used to operably associate heterologous control regions (e.g., promoter and/or enhancer) and endogenous polynucleotide sequences via homologous recombination (see, e.g., U.S. Patent No. 5,641,670, issued June 24, 1997; International Publication No. WO 96/29411, published September 26, 1996; International Publication No. WO 94/12650, published August 4, 1994; Koller et al., Proc. Natl. Acad. Sci. USA 86:8932-8935 (1989); and Zijlstra et al., Nature 342:435-438 (1989), the disclosures of each of which are incorporated by reference in their entireties).

Uses of the Polynucleotides

Each of the polynucleotides identified herein can be used in numerous ways as reagents. The following description should be considered exemplary and utilizes known techniques.

The polynucleotides of the present invention are useful for chromosome identification. There exists an ongoing need to identify new chromosome markers, since few chromosome marking reagents, based on actual sequence data (repeat polymorphisms), are presently available. Each polynucleotide of the present invention can be used as a chromosome marker.

Briefly, sequences can be mapped to chromosomes by preparing PCR primers (preferably 15-25 bp) from the sequences shown in SEQ ID NO:X. Primers can be selected using computer analysis so that primers do not span more than one predicted exon in the genomic DNA. These primers are then used for PCR screening of somatic cell hybrids containing individual human chromosomes. Only those hybrids

containing the human gene corresponding to the SEQ ID NO:X will yield an amplified fragment.

Similarly, somatic hybrids provide a rapid method of PCR mapping the polynucleotides to particular chromosomes. Three or more clones can be assigned per day using a single thermal cycler. Moreover, sublocalization of the polynucleotides can be achieved with panels of specific chromosome fragments. Other gene mapping strategies that can be used include in situ hybridization, prescreening with labeled flow-sorted chromosomes, and preselection by hybridization to construct chromosome specific-cDNA libraries.

Precise chromosomal location of the polynucleotides can also be achieved using fluorescence in situ hybridization (FISH) of a metaphase chromosomal spread. This technique uses polynucleotides as short as 500 or 600 bases; however, polynucleotides 2,000-4,000 bp are preferred. For a review of this technique, see Verma et al., "Human Chromosomes: a Manual of Basic Techniques," Pergamon Press, New York (1988).

For chromosome mapping, the polynucleotides can be used individually (to mark a single chromosome or a single site on that chromosome) or in panels (for marking multiple sites and/or multiple chromosomes). Preferred polynucleotides correspond to the noncoding regions of the cDNAs because the coding sequences are more likely conserved within gene families, thus increasing the chance of cross hybridization during chromosomal mapping.

Once a polynucleotide has been mapped to a precise chromosomal location, the physical position of the polynucleotide can be used in linkage analysis. Linkage analysis establishes coinheritance between a chromosomal location and presentation of a particular disease. (Disease mapping data are found, for example, in V. McKusick, Mendelian Inheritance in Man (available on line through Johns Hopkins University Welch Medical Library) .) Assuming 1 megabase mapping resolution and one gene per 20 kb, a cDNA precisely localized to a chromosomal region associated with the disease could be one of 50-500 potential causative genes.

Thus, once coinheritance is established, differences in the polynucleotide and the corresponding gene between affected and unaffected individuals can be examined. First, visible structural alterations in the chromosomes, such as deletions or

translocations, are examined in chromosome spreads or by PCR. If no structural alterations exist, the presence of point mutations are ascertained. Mutations observed in some or all affected individuals, but not in normal individuals, indicates that the mutation may cause the disease. However, complete sequencing of the polypeptide and the corresponding gene from several normal individuals is required to distinguish the mutation from a polymorphism. If a new polymorphism is identified, this polymorphic polypeptide can be used for further linkage analysis.

Furthermore, increased or decreased expression of the gene in affected individuals as compared to unaffected individuals can be assessed using polynucleotides of the present invention. Any of these alterations (altered expression, chromosomal rearrangement, or mutation) can be used as a diagnostic or prognostic marker.

In addition to the foregoing, a polynucleotide can be used to control gene expression through triple helix formation or antisense DNA or RNA. Both methods rely on binding of the polynucleotide to DNA or RNA. For these techniques, preferred polynucleotides are usually 20 to 40 bases in length and complementary to either the region of the gene involved in transcription (triple helix - see Lee et al., Nucl. Acids Res. 6:3073 (1979); Cooney et al., Science 241:456 (1988); and Dervan et al., Science 251:1360 (1991)) or to the mRNA itself (antisense - Okano, J. Neurochem. 56:560 (1991); Oligodeoxy-nucleotides as Antisense Inhibitors of Gene Expression, CRC Press, Boca Raton, FL (1988).) Triple helix formation optimally results in a shut-off of RNA transcription from DNA, while antisense RNA hybridization blocks translation of an mRNA molecule into polypeptide. Both techniques are effective in model systems, and the information disclosed herein can be used to design antisense or triple helix polynucleotides in an effort to treat disease.

Polynucleotides of the present invention are also useful in gene therapy. One goal of gene therapy is to insert a normal gene into an organism having a defective gene, in an effort to correct the genetic defect. The polynucleotides disclosed in the present invention offer a means of targeting such genetic defects in a highly accurate manner. Another goal is to insert a new gene that was not present in the host genome, thereby producing a new trait in the host cell.

The polynucleotides are also useful for identifying individuals from minute biological samples. The United States military, for example, is considering the use of restriction fragment length polymorphism (RFLP) for identification of its personnel. In this technique, an individual's genomic DNA is digested with one or more
5 restriction enzymes, and probed on a Southern blot to yield unique bands for identifying personnel. This method does not suffer from the current limitations of "Dog Tags" which can be lost, switched, or stolen, making positive identification difficult. The polynucleotides of the present invention can be used as additional DNA markers for RFLP.

10 The polynucleotides of the present invention can also be used as an alternative to RFLP, by determining the actual base-by-base DNA sequence of selected portions of an individual's genome. These sequences can be used to prepare PCR primers for amplifying and isolating such selected DNA, which can then be sequenced. Using this technique, individuals can be identified because each individual will have a
15 unique set of DNA sequences. Once an unique ID database is established for an individual, positive identification of that individual, living or dead, can be made from extremely small tissue samples.

Forensic biology also benefits from using DNA-based identification techniques as disclosed herein. DNA sequences taken from very small biological
20 samples such as tissues, e.g., hair or skin, or body fluids, e.g., blood, saliva, semen, etc., can be amplified using PCR. In one prior art technique, gene sequences amplified from polymorphic loci, such as DQa class II HLA gene, are used in forensic biology to identify individuals. (Erich, H., PCR Technology, Freeman and Co. (1992).) Once these specific polymorphic loci are amplified, they are digested with
25 one or more restriction enzymes, yielding an identifying set of bands on a Southern blot probed with DNA corresponding to the DQa class II HLA gene. Similarly, polynucleotides of the present invention can be used as polymorphic markers for forensic purposes.

There is also a need for reagents capable of identifying the source of a
30 particular tissue. Such need arises, for example, in forensics when presented with tissue of unknown origin. Appropriate reagents can comprise, for example, DNA probes or primers specific to particular tissue prepared from the sequences of the

present invention. Panels of such reagents can identify tissue by species and/or by organ type. In a similar fashion, these reagents can be used to screen tissue cultures for contamination.

In the very least, the polynucleotides of the present invention can be used as
5 molecular weight markers on Southern gels, as diagnostic probes for the presence of a specific mRNA in a particular cell type, as a probe to "subtract-out" known sequences in the process of discovering novel polynucleotides, for selecting and making oligomers for attachment to a "gene chip" or other support, to raise anti-DNA antibodies using DNA immunization techniques, and as an antigen to elicit an
10 immune response.

Uses of the Polypeptides

Each of the polypeptides identified herein can be used in numerous ways. The following description should be considered exemplary and utilizes known techniques.

15 A polypeptide of the present invention can be used to assay protein levels in a biological sample using antibody-based techniques. For example, protein expression in tissues can be studied with classical immunohistological methods. (Jalkanen, M., et al., J. Cell. Biol. 101:976-985 (1985); Jalkanen, M., et al., J. Cell . Biol. 105:3087-3096 (1987).) Other antibody-based methods useful for detecting protein gene
20 expression include immunoassays, such as the enzyme linked immunosorbent assay (ELISA) and the radioimmunoassay (RIA). Suitable antibody assay labels are known in the art and include enzyme labels, such as, glucose oxidase, and radioisotopes, such as iodine (125I, 121I), carbon (14C), sulfur (35S), tritium (3H), indium (112In), and technetium (99mTc), and fluorescent labels, such as fluorescein and rhodamine, and
25 biotin.

In addition to assaying secreted protein levels in a biological sample, proteins can also be detected in vivo by imaging. Antibody labels or markers for in vivo imaging of protein include those detectable by X-radiography, NMR or ESR. For X-radiography, suitable labels include radioisotopes such as barium or cesium, which
30 emit detectable radiation but are not overtly harmful to the subject. Suitable markers for NMR and ESR include those with a detectable characteristic spin, such as

deuterium, which may be incorporated into the antibody by labeling of nutrients for the relevant hybridoma.

A protein-specific antibody or antibody fragment which has been labeled with an appropriate detectable imaging moiety, such as a radioisotope (for example, ^{131}I , ^{112}In , $^{99\text{m}}\text{Tc}$), a radio-opaque substance, or a material detectable by nuclear magnetic resonance, is introduced (for example, parenterally, subcutaneously, or intraperitoneally) into the mammal. It will be understood in the art that the size of the subject and the imaging system used will determine the quantity of imaging moiety needed to produce diagnostic images. In the case of a radioisotope moiety, for a human subject, the quantity of radioactivity injected will normally range from about 5 to 20 millicuries of $^{99\text{m}}\text{Tc}$. The labeled antibody or antibody fragment will then preferentially accumulate at the location of cells which contain the specific protein. In vivo tumor imaging is described in S.W. Burchiel et al., "Immunopharmacokinetics of Radiolabeled Antibodies and Their Fragments." (Chapter 13 in Tumor Imaging: The Radiochemical Detection of Cancer, S.W. Burchiel and B. A. Rhodes, eds., Masson Publishing Inc. (1982).)

Thus, the invention provides a diagnostic method of a disorder, which involves (a) assaying the expression of a polypeptide of the present invention in cells or body fluid of an individual; (b) comparing the level of gene expression with a standard gene expression level, whereby an increase or decrease in the assayed polypeptide gene expression level compared to the standard expression level is indicative of a disorder.

Moreover, polypeptides of the present invention can be used to treat disease. For example, patients can be administered a polypeptide of the present invention in an effort to replace absent or decreased levels of the polypeptide (e.g., insulin), to supplement absent or decreased levels of a different polypeptide (e.g., hemoglobin S for hemoglobin B), to inhibit the activity of a polypeptide (e.g., an oncogene), to activate the activity of a polypeptide (e.g., by binding to a receptor), to reduce the activity of a membrane bound receptor by competing with it for free ligand (e.g., soluble TNF receptors used in reducing inflammation), or to bring about a desired response (e.g., blood vessel growth).

Similarly, antibodies directed to a polypeptide of the present invention can also be used to treat disease. For example, administration of an antibody directed to a polypeptide of the present invention can bind and reduce overproduction of the polypeptide. Similarly, administration of an antibody can activate the polypeptide, such as by binding to a polypeptide bound to a membrane (receptor).

At the very least, the polypeptides of the present invention can be used as molecular weight markers on SDS-PAGE gels or on molecular sieve gel filtration columns using methods well known to those of skill in the art. Polypeptides can also be used to raise antibodies, which in turn are used to measure protein expression from a recombinant cell, as a way of assessing transformation of the host cell. Moreover, the polypeptides of the present invention can be used to test the following biological activities.

Biological Activities

The polynucleotides and polypeptides of the present invention can be used in assays to test for one or more biological activities. If these polynucleotides and polypeptides do exhibit activity in a particular assay, it is likely that these molecules may be involved in the diseases associated with the biological activity. Thus, the polynucleotides and polypeptides could be used to treat the associated disease.

Immune Activity

A polypeptide or polynucleotide of the present invention may be useful in treating deficiencies or disorders of the immune system, by activating or inhibiting the proliferation, differentiation, or mobilization (chemotaxis) of immune cells. Immune cells develop through a process called hematopoiesis, producing myeloid (platelets, red blood cells, neutrophils, and macrophages) and lymphoid (B and T lymphocytes) cells from pluripotent stem cells. The etiology of these immune deficiencies or disorders may be genetic, somatic, such as cancer or some autoimmune disorders, acquired (e.g., by chemotherapy or toxins), or infectious. Moreover, a polynucleotide or polypeptide of the present invention can be used as a marker or detector of a particular immune system disease or disorder.

A polynucleotide or polypeptide of the present invention may be useful in treating or detecting deficiencies or disorders of hematopoietic cells. A polypeptide or polynucleotide of the present invention could be used to increase differentiation and proliferation of hematopoietic cells, including the pluripotent stem cells, in an effort to treat those disorders associated with a decrease in certain (or many) types hematopoietic cells. Examples of immunologic deficiency syndromes include, but are not limited to: blood protein disorders (e.g. agammaglobulinemia, dysgammaglobulinemia), ataxia telangiectasia, common variable immunodeficiency, Digeorge Syndrome, HIV infection, HTLV-BLV infection, leukocyte adhesion deficiency syndrome, lymphopenia, phagocyte bactericidal dysfunction, severe combined immunodeficiency (SCIDs), Wiskott-Aldrich Disorder, anemia, thrombocytopenia, or hemoglobinuria.

Moreover, a polypeptide or polynucleotide of the present invention could also be used to modulate hemostatic (the stopping of bleeding) or thrombolytic activity (clot formation). For example, by increasing hemostatic or thrombolytic activity, a polynucleotide or polypeptide of the present invention could be used to treat blood coagulation disorders (e.g., afibrinogenemia, factor deficiencies), blood platelet disorders (e.g. thrombocytopenia), or wounds resulting from trauma, surgery, or other causes. Alternatively, a polynucleotide or polypeptide of the present invention that can decrease hemostatic or thrombolytic activity could be used to inhibit or dissolve clotting. These molecules could be important in the treatment of heart attacks (infarction), strokes, or scarring.

A polynucleotide or polypeptide of the present invention may also be useful in treating or detecting autoimmune disorders. Many autoimmune disorders result from inappropriate recognition of self as foreign material by immune cells. This inappropriate recognition results in an immune response leading to the destruction of the host tissue. Therefore, the administration of a polypeptide or polynucleotide of the present invention that inhibits an immune response, particularly the proliferation, differentiation, or chemotaxis of T-cells, may be an effective therapy in preventing autoimmune disorders.

Examples of autoimmune disorders that can be treated or detected by the present invention include, but are not limited to: Addison's Disease, hemolytic

anemia, antiphospholipid syndrome, rheumatoid arthritis, dermatitis, allergic encephalomyelitis, glomerulonephritis, Goodpasture's Syndrome, Graves' Disease, Multiple Sclerosis, Myasthenia Gravis, Neuritis, Ophthalmia, Bullous Pemphigoid, Pemphigus, Polyendocrinopathies, Purpura, Reiter's Disease, Stiff-Man Syndrome, 5 Autoimmune Thyroiditis, Systemic Lupus Erythematosus, Autoimmune Pulmonary Inflammation, Guillain-Barre Syndrome, insulin dependent diabetes mellitus, and autoimmune inflammatory eye disease.

Similarly, allergic reactions and conditions, such as asthma (particularly allergic asthma) or other respiratory problems, may also be treated by a polypeptide 10 or polynucleotide of the present invention. Moreover, these molecules can be used to treat anaphylaxis, hypersensitivity to an antigenic molecule, or blood group incompatibility.

A polynucleotide or polypeptide of the present invention may also be used to treat and/or prevent organ rejection or graft-versus-host disease (GVHD). Organ 15 rejection occurs by host immune cell destruction of the transplanted tissue through an immune response. Similarly, an immune response is also involved in GVHD, but, in this case, the foreign transplanted immune cells destroy the host tissues. The administration of a polypeptide or polynucleotide of the present invention that inhibits an immune response, particularly the proliferation, differentiation, or chemotaxis of 20 T-cells, may be an effective therapy in preventing organ rejection or GVHD.

Similarly, a polypeptide or polynucleotide of the present invention may also be used to modulate inflammation. For example, the polypeptide or polynucleotide may inhibit the proliferation and differentiation of cells involved in an inflammatory response. These molecules can be used to treat inflammatory conditions, both chronic 25 and acute conditions, including inflammation associated with infection (e.g., septic shock, sepsis, or systemic inflammatory response syndrome (SIRS)), ischemia-reperfusion injury, endotoxin lethality, arthritis, complement-mediated hyperacute rejection, nephritis, cytokine or chemokine induced lung injury, inflammatory bowel disease, Crohn's disease, or resulting from over production of cytokines (e.g., TNF or 30 IL-1.)

Hyperproliferative Disorders

A polypeptide or polynucleotide can be used to treat or detect hyperproliferative disorders, including neoplasms. A polypeptide or polynucleotide of the present invention may inhibit the proliferation of the disorder through direct or indirect interactions. Alternatively, a polypeptide or polynucleotide of the present invention may proliferate other cells which can inhibit the hyperproliferative disorder.

For example, by increasing an immune response, particularly increasing antigenic qualities of the hyperproliferative disorder or by proliferating, differentiating, or mobilizing T-cells, hyperproliferative disorders can be treated. This immune response may be increased by either enhancing an existing immune response, or by initiating a new immune response. Alternatively, decreasing an immune response may also be a method of treating hyperproliferative disorders, such as a chemotherapeutic agent.

Examples of hyperproliferative disorders that can be treated or detected by a polynucleotide or polypeptide of the present invention include, but are not limited to neoplasms located in the: abdomen, bone, breast, digestive system, liver, pancreas, peritoneum, endocrine glands (adrenal, parathyroid, pituitary, testicles, ovary, thymus, thyroid), eye, head and neck, nervous (central and peripheral), lymphatic system, pelvic, skin, soft tissue, spleen, thoracic, and urogenital.

Similarly, other hyperproliferative disorders can also be treated or detected by a polynucleotide or polypeptide of the present invention. Examples of such hyperproliferative disorders include, but are not limited to: hypergammaglobulinemia, lymphoproliferative disorders, paraproteinemias, purpura, sarcoidosis, Sezary Syndrome, Waldenström's Macroglobulinemia, Gaucher's Disease, histiocytosis, and any other hyperproliferative disease, besides neoplasia, located in an organ system listed above.

Infectious Disease

A polypeptide or polynucleotide of the present invention can be used to treat or detect infectious agents. For example, by increasing the immune response, particularly increasing the proliferation and differentiation of B and/or T cells, infectious diseases may be treated. The immune response may be increased by either enhancing an existing immune response, or by initiating a new immune response.

Alternatively, the polypeptide or polynucleotide of the present invention may also directly inhibit the infectious agent, without necessarily eliciting an immune response.

Viruses are one example of an infectious agent that can cause disease or symptoms that can be treated or detected by a polynucleotide or polypeptide of the present invention. Examples of viruses, include, but are not limited to the following DNA and RNA viral families: Arbovirus, Adenoviridae, Arenaviridae, Arterivirus, Birnaviridae, Bunyaviridae, Caliciviridae, Circoviridae, Coronaviridae, Flaviviridae, Hepadnaviridae (Hepatitis), Herpesviridae (such as, Cytomegalovirus, Herpes Simplex, Herpes Zoster), Mononegavirus (e.g., Paramyxoviridae, Morbillivirus, Rhabdoviridae), Orthomyxoviridae (e.g., Influenza), Papovaviridae, Parvoviridae, Picornaviridae, Poxviridae (such as Smallpox or Vaccinia), Reoviridae (e.g., Rotavirus), Retroviridae (HTLV-I, HTLV-II, Lentivirus), and Togaviridae (e.g., Rubivirus). Viruses falling within these families can cause a variety of diseases or symptoms, including, but not limited to: arthritis, bronchiolitis, encephalitis, eye infections (e.g., conjunctivitis, keratitis), chronic fatigue syndrome, hepatitis (A, B, C, E, Chronic Active, Delta), meningitis, opportunistic infections (e.g., AIDS), pneumonia, Burkitt's Lymphoma, chickenpox, hemorrhagic fever, Measles, Mumps, Parainfluenza, Rabies, the common cold, Polio, leukemia, Rubella, sexually transmitted diseases, skin diseases (e.g., Kaposi's, warts), and viremia. A polypeptide or polynucleotide of the present invention can be used to treat or detect any of these symptoms or diseases.

Similarly, bacterial or fungal agents that can cause disease or symptoms and that can be treated or detected by a polynucleotide or polypeptide of the present invention include, but not limited to, the following Gram-Negative and Gram-positive bacterial families and fungi: Actinomycetales (e.g., Corynebacterium, Mycobacterium, Nocardia), Aspergillosis, Bacillaceae (e.g., Anthrax, Clostridium), Bacteroidaceae, Blastomycosis, Bordetella, Borrelia, Brucellosis, Candidiasis, Campylobacter, Coccidioidomycosis, Cryptococcosis, Dermatocycoses, Enterobacteriaceae (Klebsiella, Salmonella, Serratia, Yersinia), Erysipelothrix, Helicobacter, Legionellosis, Leptospirosis, Listeria, Mycoplasmatales, Neisseriaceae (e.g., Acinetobacter, Gonorrhea, Meningococcal), Pasteurellaceae Infections (e.g., Actinobacillus, Haemophilus, Pasteurella), Pseudomonas, Rickettsiaceae,

Chlamydiaceae, Syphilis, and Staphylococcal. These bacterial or fungal families can cause the following diseases or symptoms, including, but not limited to: bacteremia, endocarditis, eye infections (conjunctivitis, tuberculosis, uveitis), gingivitis, opportunistic infections (e.g., AIDS related infections), paronychia, prosthesis-related infections, Reiter's Disease, respiratory tract infections, such as Whooping Cough or Empyema, sepsis, Lyme Disease, Cat-Scratch Disease, Dysentery, Paratyphoid Fever, food poisoning, Typhoid, pneumonia, Gonorrhea, meningitis, Chlamydia, Syphilis, Diphtheria, Leprosy, Paratuberculosis, Tuberculosis, Lupus, Botulism, gangrene, tetanus, impetigo, Rheumatic Fever, Scarlet Fever, sexually transmitted diseases, skin diseases (e.g., cellulitis, dermatocycoses), toxemia, urinary tract infections, wound infections. A polypeptide or polynucleotide of the present invention can be used to treat or detect any of these symptoms or diseases.

Moreover, parasitic agents causing disease or symptoms that can be treated or detected by a polynucleotide or polypeptide of the present invention include, but not limited to, the following families: Amebiasis, Babesiosis, Coccidiosis, Cryptosporidiosis, Dientamoebiasis, Dourine, Ectoparasitic, Giardiasis, Helminthiasis, Leishmaniasis, Theileriasis, Toxoplasmosis, Trypanosomiasis, and Trichomonas. These parasites can cause a variety of diseases or symptoms, including, but not limited to: Scabies, Trombiculiasis, eye infections, intestinal disease (e.g., dysentery, giardiasis), liver disease, lung disease, opportunistic infections (e.g., AIDS related), Malaria, pregnancy complications, and toxoplasmosis. A polypeptide or polynucleotide of the present invention can be used to treat or detect any of these symptoms or diseases.

Preferably, treatment using a polypeptide or polynucleotide of the present invention could either be by administering an effective amount of a polypeptide to the patient, or by removing cells from the patient, supplying the cells with a polynucleotide of the present invention, and returning the engineered cells to the patient (ex vivo therapy). Moreover, the polypeptide or polynucleotide of the present invention can be used as an antigen in a vaccine to raise an immune response against infectious disease.

Regeneration

A polynucleotide or polypeptide of the present invention can be used to differentiate, proliferate, and attract cells, leading to the regeneration of tissues. (See, Science 276:59-87 (1997).) The regeneration of tissues could be used to repair, replace, or protect tissue damaged by congenital defects, trauma (wounds, burns, incisions, or ulcers), age, disease (e.g. osteoporosis, osteoarthritis, periodontal disease, liver failure), surgery, including cosmetic plastic surgery, fibrosis, reperfusion injury, or systemic cytokine damage.

Tissues that could be regenerated using the present invention include organs (e.g., pancreas, liver, intestine, kidney, skin, endothelium), muscle (smooth, skeletal or cardiac), vasculature (including vascular and lymphatics), nervous, hematopoietic, and skeletal (bone, cartilage, tendon, and ligament) tissue. Preferably, regeneration occurs without or decreased scarring. Regeneration also may include angiogenesis.

Moreover, a polynucleotide or polypeptide of the present invention may increase regeneration of tissues difficult to heal. For example, increased tendon/ligament regeneration would quicken recovery time after damage. A polynucleotide or polypeptide of the present invention could also be used prophylactically in an effort to avoid damage. Specific diseases that could be treated include of tendinitis, carpal tunnel syndrome, and other tendon or ligament defects. A further example of tissue regeneration of non-healing wounds includes pressure ulcers, ulcers associated with vascular insufficiency, surgical, and traumatic wounds.

Similarly, nerve and brain tissue could also be regenerated by using a polynucleotide or polypeptide of the present invention to proliferate and differentiate nerve cells. Diseases that could be treated using this method include central and peripheral nervous system diseases, neuropathies, or mechanical and traumatic disorders (e.g., spinal cord disorders, head trauma, cerebrovascular disease, and stroke). Specifically, diseases associated with peripheral nerve injuries, peripheral neuropathy (e.g., resulting from chemotherapy or other medical therapies), localized neuropathies, and central nervous system diseases (e.g., Alzheimer's disease, Parkinson's disease, Huntington's disease, amyotrophic lateral sclerosis, and Shy-Drager syndrome), could all be treated using the polynucleotide or polypeptide of the present invention.

Chemotaxis

A polynucleotide or polypeptide of the present invention may have chemotaxis activity. A chemotactic molecule attracts or mobilizes cells (e.g., monocytes, fibroblasts, neutrophils, T-cells, mast cells, eosinophils, epithelial and/or endothelial cells) to a particular site in the body, such as inflammation, infection, or site of hyperproliferation. The mobilized cells can then fight off and/or heal the particular trauma or abnormality.

A polynucleotide or polypeptide of the present invention may increase chemotactic activity of particular cells. These chemotactic molecules can then be used to treat inflammation, infection, hyperproliferative disorders, or any immune system disorder by increasing the number of cells targeted to a particular location in the body. For example, chemotactic molecules can be used to treat wounds and other trauma to tissues by attracting immune cells to the injured location. Chemotactic molecules of the present invention can also attract fibroblasts, which can be used to treat wounds.

It is also contemplated that a polynucleotide or polypeptide of the present invention may inhibit chemotactic activity. These molecules could also be used to treat disorders. Thus, a polynucleotide or polypeptide of the present invention could be used as an inhibitor of chemotaxis.

Binding Activity

A polypeptide of the present invention may be used to screen for molecules that bind to the polypeptide or for molecules to which the polypeptide binds. The binding of the polypeptide and the molecule may activate (agonist), increase, inhibit (antagonist), or decrease activity of the polypeptide or the molecule bound. Examples of such molecules include antibodies, oligonucleotides, proteins (e.g., receptors), or small molecules.

Preferably, the molecule is closely related to the natural ligand of the polypeptide, e.g., a fragment of the ligand, or a natural substrate, a ligand, a structural or functional mimetic. (See, Coligan et al., Current Protocols in Immunology 1(2):Chapter 5 (1991).) Similarly, the molecule can be closely related to the natural receptor to which the polypeptide binds, or at least, a fragment of the receptor capable

of being bound by the polypeptide (e.g., active site). In either case, the molecule can be rationally designed using known techniques.

Preferably, the screening for these molecules involves producing appropriate cells which express the polypeptide, either as a secreted protein or on the cell
5 membrane. Preferred cells include cells from mammals, yeast, *Drosophila*, or *E. coli*. Cells expressing the polypeptide (or cell membrane containing the expressed polypeptide) are then preferably contacted with a test compound potentially containing the molecule to observe binding, stimulation, or inhibition of activity of either the polypeptide or the molecule.

10 The assay may simply test binding of a candidate compound to the polypeptide, wherein binding is detected by a label, or in an assay involving competition with a labeled competitor. Further, the assay may test whether the candidate compound results in a signal generated by binding to the polypeptide.

Alternatively, the assay can be carried out using cell-free preparations,
15 polypeptide/molecule affixed to a solid support, chemical libraries, or natural product mixtures. The assay may also simply comprise the steps of mixing a candidate compound with a solution containing a polypeptide, measuring polypeptide/molecule activity or binding, and comparing the polypeptide/molecule activity or binding to a standard.

20 Preferably, an ELISA assay can measure polypeptide level or activity in a sample (e.g., biological sample) using a monoclonal or polyclonal antibody. The antibody can measure polypeptide level or activity by either binding, directly or indirectly, to the polypeptide or by competing with the polypeptide for a substrate.

All of these above assays can be used as diagnostic or prognostic markers.
25 The molecules discovered using these assays can be used to treat disease or to bring about a particular result in a patient (e.g., blood vessel growth) by activating or inhibiting the polypeptide/molecule. Moreover, the assays can discover agents which may inhibit or enhance the production of the polypeptide from suitably manipulated cells or tissues.

30 Therefore, the invention includes a method of identifying compounds which bind to a polypeptide of the invention comprising the steps of: (a) incubating a

candidate binding compound with a polypeptide of the invention; and (b) determining if binding has occurred. Moreover, the invention includes a method of identifying agonists/antagonists comprising the steps of: (a) incubating a candidate compound with a polypeptide of the invention, (b) assaying a biological activity, and (b) determining if a biological activity of the polypeptide has been altered.

Other Activities

A polypeptide or polynucleotide of the present invention may also increase or decrease the differentiation or proliferation of embryonic stem cells, besides, as discussed above, hematopoietic lineage.

A polypeptide or polynucleotide of the present invention may also be used to modulate mammalian characteristics, such as body height, weight, hair color, eye color, skin, percentage of adipose tissue, pigmentation, size, and shape (e.g., cosmetic surgery). Similarly, a polypeptide or polynucleotide of the present invention may be used to modulate mammalian metabolism affecting catabolism, anabolism, processing, utilization, and storage of energy.

A polypeptide or polynucleotide of the present invention may be used to change a mammal's mental state or physical state by influencing biorhythms, cardiac rhythms, depression (including depressive disorders), tendency for violence, tolerance for pain, reproductive capabilities (preferably by Activin or Inhibin-like activity), hormonal or endocrine levels, appetite, libido, memory, stress, or other cognitive qualities.

A polypeptide or polynucleotide of the present invention may also be used as a food additive or preservative, such as to increase or decrease storage capabilities, fat content, lipid, protein, carbohydrate, vitamins, minerals, cofactors or other nutritional components.

Other Preferred Embodiments

Other preferred embodiments of the claimed invention include an isolated nucleic acid molecule comprising a nucleotide sequence which is at least 95%

identical to a sequence of at least about 50 contiguous nucleotides in the nucleotide sequence of SEQ ID NO:X wherein X is any integer as defined in Table 1.

Also preferred is a nucleic acid molecule wherein said sequence of contiguous nucleotides is included in the nucleotide sequence of SEQ ID NO:X in the range of positions beginning with the nucleotide at about the position of the 5' Nucleotide of the Clone Sequence and ending with the nucleotide at about the position of the 3' Nucleotide of the Clone Sequence as defined for SEQ ID NO:X in Table 1.

Also preferred is a nucleic acid molecule wherein said sequence of contiguous nucleotides is included in the nucleotide sequence of SEQ ID NO:X in the range of positions beginning with the nucleotide at about the position of the 5' Nucleotide of the Start Codon and ending with the nucleotide at about the position of the 3' Nucleotide of the Clone Sequence as defined for SEQ ID NO:X in Table 1.

Similarly preferred is a nucleic acid molecule wherein said sequence of contiguous nucleotides is included in the nucleotide sequence of SEQ ID NO:X in the range of positions beginning with the nucleotide at about the position of the 5' Nucleotide of the First Amino Acid of the Signal Peptide and ending with the nucleotide at about the position of the 3' Nucleotide of the Clone Sequence as defined for SEQ ID NO:X in Table 1.

Also preferred is an isolated nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to a sequence of at least about 150 contiguous nucleotides in the nucleotide sequence of SEQ ID NO:X.

Further preferred is an isolated nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to a sequence of at least about 500 contiguous nucleotides in the nucleotide sequence of SEQ ID NO:X.

A further preferred embodiment is a nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to the nucleotide sequence of SEQ ID NO:X beginning with the nucleotide at about the position of the 5' Nucleotide of the First Amino Acid of the Signal Peptide and ending with the nucleotide at about the position of the 3' Nucleotide of the Clone Sequence as defined for SEQ ID NO:X in Table 1.

A further preferred embodiment is an isolated nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to the complete nucleotide sequence of SEQ ID NO:X.

Also preferred is an isolated nucleic acid molecule which hybridizes under
5 stringent hybridization conditions to a nucleic acid molecule, wherein said nucleic acid molecule which hybridizes does not hybridize under stringent hybridization conditions to a nucleic acid molecule having a nucleotide sequence consisting of only A residues or of only T residues.

Also preferred is a composition of matter comprising a DNA molecule which
10 comprises a human cDNA clone identified by a cDNA Clone Identifier in Table 1, which DNA molecule is contained in the material deposited with the American Type Culture Collection and given the ATCC Deposit Number shown in Table 1 for said cDNA Clone Identifier.

Also preferred is an isolated nucleic acid molecule comprising a nucleotide
15 sequence which is at least 95% identical to a sequence of at least 50 contiguous nucleotides in the nucleotide sequence of a human cDNA clone identified by a cDNA Clone Identifier in Table 1, which DNA molecule is contained in the deposit given the ATCC Deposit Number shown in Table 1.

Also preferred is an isolated nucleic acid molecule, wherein said sequence of
20 at least 50 contiguous nucleotides is included in the nucleotide sequence of the complete open reading frame sequence encoded by said human cDNA clone.

Also preferred is an isolated nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to sequence of at least 150 contiguous nucleotides in the nucleotide sequence encoded by said human cDNA clone.

25 A further preferred embodiment is an isolated nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to sequence of at least 500 contiguous nucleotides in the nucleotide sequence encoded by said human cDNA clone.

A further preferred embodiment is an isolated nucleic acid molecule
30 comprising a nucleotide sequence which is at least 95% identical to the complete nucleotide sequence encoded by said human cDNA clone.

A further preferred embodiment is a method for detecting in a biological sample a nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from the group consisting of: a nucleotide sequence of SEQ ID NO:X
5 wherein X is any integer as defined in Table 1; and a nucleotide sequence encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1; which method comprises a step of comparing a nucleotide sequence of at least one nucleic acid molecule in said sample with a sequence selected from said group and
10 determining whether the sequence of said nucleic acid molecule in said sample is at least 95% identical to said selected sequence.

Also preferred is the above method wherein said step of comparing sequences comprises determining the extent of nucleic acid hybridization between nucleic acid molecules in said sample and a nucleic acid molecule comprising said sequence
15 selected from said group. Similarly, also preferred is the above method wherein said step of comparing sequences is performed by comparing the nucleotide sequence determined from a nucleic acid molecule in said sample with said sequence selected from said group. The nucleic acid molecules can comprise DNA molecules or RNA molecules.

20 A further preferred embodiment is a method for identifying the species, tissue or cell type of a biological sample which method comprises a step of detecting nucleic acid molecules in said sample, if any, comprising a nucleotide sequence that is at least 95% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from the group consisting of: a nucleotide sequence of SEQ ID NO:X
25 wherein X is any integer as defined in Table 1; and a nucleotide sequence encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1.

The method for identifying the species, tissue or cell type of a biological
30 sample can comprise a step of detecting nucleic acid molecules comprising a nucleotide sequence in a panel of at least two nucleotide sequences, wherein at least

one sequence in said panel is at least 95% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from said group.

Also preferred is a method for diagnosing in a subject a pathological condition associated with abnormal structure or expression of a gene encoding a secreted protein identified in Table 1, which method comprises a step of detecting in a biological sample obtained from said subject nucleic acid molecules, if any, comprising a nucleotide sequence that is at least 95% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from the group consisting of: a nucleotide sequence of SEQ ID NO:X wherein X is any integer as defined in Table 1; and a nucleotide sequence encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1.

The method for diagnosing a pathological condition can comprise a step of detecting nucleic acid molecules comprising a nucleotide sequence in a panel of at least two nucleotide sequences, wherein at least one sequence in said panel is at least 95% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from said group.

Also preferred is a composition of matter comprising isolated nucleic acid molecules wherein the nucleotide sequences of said nucleic acid molecules comprise a panel of at least two nucleotide sequences, wherein at least one sequence in said panel is at least 95% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from the group consisting of: a nucleotide sequence of SEQ ID NO:X wherein X is any integer as defined in Table 1; and a nucleotide sequence encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1. The nucleic acid molecules can comprise DNA molecules or RNA molecules.

Also preferred is an isolated polypeptide comprising an amino acid sequence at least 90% identical to a sequence of at least about 10 contiguous amino acids in the amino acid sequence of SEQ ID NO:Y wherein Y is any integer as defined in Table 1.

Also preferred is a polypeptide, wherein said sequence of contiguous amino acids is included in the amino acid sequence of SEQ ID NO:Y in the range of

positions beginning with the residue at about the position of the First Amino Acid of the Secreted Portion and ending with the residue at about the Last Amino Acid of the Open Reading Frame as set forth for SEQ ID NO:Y in Table 1.

Also preferred is an isolated polypeptide comprising an amino acid sequence
5 at least 95% identical to a sequence of at least about 30 contiguous amino acids in the amino acid sequence of SEQ ID NO:Y.

Further preferred is an isolated polypeptide comprising an amino acid sequence at least 95% identical to a sequence of at least about 100 contiguous amino acids in the amino acid sequence of SEQ ID NO:Y.

10 Further preferred is an isolated polypeptide comprising an amino acid sequence at least 95% identical to the complete amino acid sequence of SEQ ID NO:Y.

Further preferred is an isolated polypeptide comprising an amino acid sequence at least 90% identical to a sequence of at least about 10 contiguous amino
15 acids in the complete amino acid sequence of a secreted protein encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1.

Also preferred is a polypeptide wherein said sequence of contiguous amino acids is included in the amino acid sequence of a secreted portion of the secreted
20 protein encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1.

Also preferred is an isolated polypeptide comprising an amino acid sequence at least 95% identical to a sequence of at least about 30 contiguous amino acids in the
25 amino acid sequence of the secreted portion of the protein encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1.

Also preferred is an isolated polypeptide comprising an amino acid sequence at least 95% identical to a sequence of at least about 100 contiguous amino acids in
30 the amino acid sequence of the secreted portion of the protein encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1.

Also preferred is an isolated polypeptide comprising an amino acid sequence at least 95% identical to the amino acid sequence of the secreted portion of the protein encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1.

Further preferred is an isolated antibody which binds specifically to a polypeptide comprising an amino acid sequence that is at least 90% identical to a sequence of at least 10 contiguous amino acids in a sequence selected from the group consisting of: an amino acid sequence of SEQ ID NO:Y wherein Y is any integer as defined in Table 1; and a complete amino acid sequence of a protein encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1.

Further preferred is a method for detecting in a biological sample a polypeptide comprising an amino acid sequence which is at least 90% identical to a sequence of at least 10 contiguous amino acids in a sequence selected from the group consisting of: an amino acid sequence of SEQ ID NO:Y wherein Y is any integer as defined in Table 1; and a complete amino acid sequence of a protein encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1; which method comprises a step of comparing an amino acid sequence of at least one polypeptide molecule in said sample with a sequence selected from said group and determining whether the sequence of said polypeptide molecule in said sample is at least 90% identical to said sequence of at least 10 contiguous amino acids.

Also preferred is the above method wherein said step of comparing an amino acid sequence of at least one polypeptide molecule in said sample with a sequence selected from said group comprises determining the extent of specific binding of polypeptides in said sample to an antibody which binds specifically to a polypeptide comprising an amino acid sequence that is at least 90% identical to a sequence of at least 10 contiguous amino acids in a sequence selected from the group consisting of: an amino acid sequence of SEQ ID NO:Y wherein Y is any integer as defined in Table 1; and a complete amino acid sequence of a protein encoded by a human cDNA

clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1.

Also preferred is the above method wherein said step of comparing sequences is performed by comparing the amino acid sequence determined from a polypeptide molecule in said sample with said sequence selected from said group.

Also preferred is a method for identifying the species, tissue or cell type of a biological sample which method comprises a step of detecting polypeptide molecules in said sample, if any, comprising an amino acid sequence that is at least 90% identical to a sequence of at least 10 contiguous amino acids in a sequence selected from the group consisting of: an amino acid sequence of SEQ ID NO:Y wherein Y is any integer as defined in Table 1; and a complete amino acid sequence of a secreted protein encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1.

Also preferred is the above method for identifying the species, tissue or cell type of a biological sample, which method comprises a step of detecting polypeptide molecules comprising an amino acid sequence in a panel of at least two amino acid sequences, wherein at least one sequence in said panel is at least 90% identical to a sequence of at least 10 contiguous amino acids in a sequence selected from the above group.

Also preferred is a method for diagnosing in a subject a pathological condition associated with abnormal structure or expression of a gene encoding a secreted protein identified in Table 1, which method comprises a step of detecting in a biological sample obtained from said subject polypeptide molecules comprising an amino acid sequence in a panel of at least two amino acid sequences, wherein at least one sequence in said panel is at least 90% identical to a sequence of at least 10 contiguous amino acids in a sequence selected from the group consisting of: an amino acid sequence of SEQ ID NO:Y wherein Y is any integer as defined in Table 1; and a complete amino acid sequence of a secreted protein encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1.

In any of these methods, the step of detecting said polypeptide molecules includes using an antibody.

Also preferred is an isolated nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to a nucleotide sequence encoding a polypeptide wherein said polypeptide comprises an amino acid sequence that is at least 90% identical to a sequence of at least 10 contiguous amino acids in a sequence selected from the group consisting of: an amino acid sequence of SEQ ID NO:Y wherein Y is any integer as defined in Table 1; and a complete amino acid sequence of a secreted protein encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1.

Also preferred is an isolated nucleic acid molecule, wherein said nucleotide sequence encoding a polypeptide has been optimized for expression of said polypeptide in a prokaryotic host.

Also preferred is an isolated nucleic acid molecule, wherein said polypeptide comprises an amino acid sequence selected from the group consisting of: an amino acid sequence of SEQ ID NO:Y wherein Y is any integer as defined in Table 1; and a complete amino acid sequence of a secreted protein encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1.

Further preferred is a method of making a recombinant vector comprising inserting any of the above isolated nucleic acid molecule into a vector. Also preferred is the recombinant vector produced by this method. Also preferred is a method of making a recombinant host cell comprising introducing the vector into a host cell, as well as the recombinant host cell produced by this method.

Also preferred is a method of making an isolated polypeptide comprising culturing this recombinant host cell under conditions such that said polypeptide is expressed and recovering said polypeptide. Also preferred is this method of making an isolated polypeptide, wherein said recombinant host cell is a eukaryotic cell and said polypeptide is a secreted portion of a human secreted protein comprising an amino acid sequence selected from the group consisting of: an amino acid sequence of SEQ ID NO:Y beginning with the residue at the position of the First Amino Acid of

the Secreted Portion of SEQ ID NO:Y wherein Y is an integer set forth in Table 1 and said position of the First Amino Acid of the Secreted Portion of SEQ ID NO:Y is defined in Table 1; and an amino acid sequence of a secreted portion of a protein encoded by a human cDNA clone identified by a cDNA Clone Identifier in Table 1
5 and contained in the deposit with the ATCC Deposit Number shown for said cDNA clone in Table 1. The isolated polypeptide produced by this method is also preferred.

Also preferred is a method of treatment of an individual in need of an increased level of a secreted protein activity, which method comprises administering to such an individual a pharmaceutical composition comprising an amount of an
10 isolated polypeptide, polynucleotide, or antibody of the claimed invention effective to increase the level of said protein activity in said individual.

Having generally described the invention, the same will be more readily understood by reference to the following examples, which are provided by way of illustration and are not intended as limiting.

15

Examples

Example 1: Isolation of a Selected cDNA Clone From the Deposited Sample

Each cDNA clone in a cited ATCC deposit is contained in a plasmid vector.
20 Table 1 identifies the vectors used to construct the cDNA library from which each clone was isolated. In many cases, the vector used to construct the library is a phage vector from which a plasmid has been excised. The table immediately below correlates the related plasmid for each phage vector used in constructing the cDNA library. For example, where a particular clone is identified in Table 1 as being
25 isolated in the vector "Lambda Zap," the corresponding deposited clone is in "pBluescript."

	<u>Vector Used to Construct Library</u>	<u>Corresponding Deposited</u>
	<u>Plasmid</u>	
	Lambda Zap	pBluescript (pBS)
30	Uni-Zap XR	pBluescript (pBS)
	Zap Express	pBK
	lafmid BA	plafmid BA

pSport1

pSport1

pCMVSPORT 2.0

pCMVSPORT 2.0

pCMVSPORT 3.0

pCMVSPORT 3.0

pCR[®]2.1pCR[®]2.1

- 5 Vectors Lambda Zap (U.S. Patent Nos. 5,128,256 and 5,286,636), Uni-Zap XR (U.S. Patent Nos. 5,128, 256 and 5,286,636), Zap Express (U.S. Patent Nos. 5,128,256 and 5,286,636), pBluescript (pBS) (Short, J. M. et al., Nucleic Acids Res. 16:7583-7600 (1988); Altting-Mees, M. A. and Short, J. M., Nucleic Acids Res. 17:9494 (1989)) and pBK (Altting-Mees, M. A. et al., Strategies 5:58-61 (1992)) are
- 10 commercially available from Stratagene Cloning Systems, Inc., 11011 N. Torrey Pines Road, La Jolla, CA, 92037. pBS contains an ampicillin resistance gene and pBK contains a neomycin resistance gene. Both can be transformed into E. coli strain XL-1 Blue, also available from Stratagene. pBS comes in 4 forms SK+, SK-, KS+ and KS. The S and K refers to the orientation of the polylinker to the T7 and T3
- 15 primer sequences which flank the polylinker region ("S" is for SacI and "K" is for KpnI which are the first sites on each respective end of the linker). "+" or "-" refer to the orientation of the f1 origin of replication ("ori"), such that in one orientation, single stranded rescue initiated from the f1 ori generates sense strand DNA and in the other, antisense.
- 20 Vectors pSport1, pCMVSPORT 2.0 and pCMVSPORT 3.0, were obtained from Life Technologies, Inc., P. O. Box 6009, Gaithersburg, MD 20897. All Sport vectors contain an ampicillin resistance gene and may be transformed into E. coli strain DH10B, also available from Life Technologies. (See, for instance, Gruber, C. E., et al., Focus 15:59 (1993).) Vector lafmid BA (Bento Soares, Columbia University,
- 25 NY) contains an ampicillin resistance gene and can be transformed into E. coli strain XL-1 Blue. Vector pCR[®]2.1, which is available from Invitrogen, 1600 Faraday Avenue, Carlsbad, CA 92008, contains an ampicillin resistance gene and may be transformed into E. coli strain DH10B, available from Life Technologies. (See, for instance, Clark, J. M., Nuc. Acids Res. 16:9677-9686 (1988) and Mead, D. et al.,
- 30 Bio/Technology 9: (1991).) Preferably, a polynucleotide of the present invention does not comprise the phage vector sequences identified for the particular clone in Table 1, as well as the corresponding plasmid vector sequences designated above.

The deposited material in the sample assigned the ATCC Deposit Number cited in Table 1 for any given cDNA clone also may contain one or more additional plasmids, each comprising a cDNA clone different from that given clone. Thus, deposits sharing the same ATCC Deposit Number contain at least a plasmid for each cDNA clone identified in Table 1. Typically, each ATCC deposit sample cited in Table 1 comprises a mixture of approximately equal amounts (by weight) of about 50 plasmid DNAs, each containing a different cDNA clone; but such a deposit sample may include plasmids for more or less than 50 cDNA clones, up to about 500 cDNA clones.

Two approaches can be used to isolate a particular clone from the deposited sample of plasmid DNAs cited for that clone in Table 1. First, a plasmid is directly isolated by screening the clones using a polynucleotide probe corresponding to SEQ ID NO:X.

Particularly, a specific polynucleotide with 30-40 nucleotides is synthesized using an Applied Biosystems DNA synthesizer according to the sequence reported. The oligonucleotide is labeled, for instance, with ^{32}P - γ -ATP using T4 polynucleotide kinase and purified according to routine methods. (E.g., Maniatis et al., *Molecular Cloning: A Laboratory Manual*, Cold Spring Harbor Press, Cold Spring, NY (1982).) The plasmid mixture is transformed into a suitable host, as indicated above (such as XL-1 Blue (Stratagene)) using techniques known to those of skill in the art, such as those provided by the vector supplier or in related publications or patents cited above. The transformants are plated on 1.5% agar plates (containing the appropriate selection agent, e.g., ampicillin) to a density of about 150 transformants (colonies) per plate. These plates are screened using Nylon membranes according to routine methods for bacterial colony screening (e.g., Sambrook et al., *Molecular Cloning: A Laboratory Manual*, 2nd Edit., (1989), Cold Spring Harbor Laboratory Press, pages 1.93 to 1.104), or other techniques known to those of skill in the art.

Alternatively, two primers of 17-20 nucleotides derived from both ends of the SEQ ID NO:X (i.e., within the region of SEQ ID NO:X bounded by the 5' NT and the 3' NT of the clone defined in Table 1) are synthesized and used to amplify the desired cDNA using the deposited cDNA plasmid as a template. The polymerase chain reaction is carried out under routine conditions, for instance, in 25 μl of reaction

mixture with 0.5 ug of the above cDNA template. A convenient reaction mixture is 1.5-5 mM MgCl₂, 0.01% (w/v) gelatin, 20 μM each of dATP, dCTP, dGTP, dTTP, 25 pmol of each primer and 0.25 Unit of Taq polymerase. Thirty five cycles of PCR (denaturation at 94°C for 1 min; annealing at 55°C for 1 min; elongation at 72°C for 1 min) are performed with a Perkin-Elmer Cetus automated thermal cycler. The amplified product is analyzed by agarose gel electrophoresis and the DNA band with expected molecular weight is excised and purified. The PCR product is verified to be the selected sequence by subcloning and sequencing the DNA product.

Several methods are available for the identification of the 5' or 3' non-coding portions of a gene which may not be present in the deposited clone. These methods include but are not limited to, filter probing, clone enrichment using specific probes, and protocols similar or identical to 5' and 3' "RACE" protocols which are well known in the art. For instance, a method similar to 5' RACE is available for generating the missing 5' end of a desired full-length transcript. (Fromont-Racine et al., Nucleic Acids Res. 21(7):1683-1684 (1993).)

Briefly, a specific RNA oligonucleotide is ligated to the 5' ends of a population of RNA presumably containing full-length gene RNA transcripts. A primer set containing a primer specific to the ligated RNA oligonucleotide and a primer specific to a known sequence of the gene of interest is used to PCR amplify the 5' portion of the desired full-length gene. This amplified product may then be sequenced and used to generate the full length gene.

This above method starts with total RNA isolated from the desired source, although poly-A+ RNA can be used. The RNA preparation can then be treated with phosphatase if necessary to eliminate 5' phosphate groups on degraded or damaged RNA which may interfere with the later RNA ligase step. The phosphatase should then be inactivated and the RNA treated with tobacco acid pyrophosphatase in order to remove the cap structure present at the 5' ends of messenger RNAs. This reaction leaves a 5' phosphate group at the 5' end of the cap cleaved RNA which can then be ligated to an RNA oligonucleotide using T4 RNA ligase.

This modified RNA preparation is used as a template for first strand cDNA synthesis using a gene specific oligonucleotide. The first strand synthesis reaction is used as a template for PCR amplification of the desired 5' end using a primer specific

to the ligated RNA oligonucleotide and a primer specific to the known sequence of the gene of interest. The resultant product is then sequenced and analyzed to confirm that the 5' end sequence belongs to the desired gene.

5 **Example 2: Isolation of Genomic Clones Corresponding to a Polynucleotide**

A human genomic P1 library (Genomic Systems, Inc.) is screened by PCR using primers selected for the cDNA sequence corresponding to SEQ ID NO:X., according to the method described in Example 1. (See also, Sambrook.)

10 **Example 3: Tissue Distribution of Polypeptide**

Tissue distribution of mRNA expression of polynucleotides of the present invention is determined using protocols for Northern blot analysis, described by, among others, Sambrook et al. For example, a cDNA probe produced by the method described in Example 1 is labeled with P³² using the rediprime™ DNA labeling
15 system (Amersham Life Science), according to manufacturer's instructions. After labeling, the probe is purified using CHROMA SPIN-100™ column (Clontech Laboratories, Inc.), according to manufacturer's protocol number PT1200-1. The purified labeled probe is then used to examine various human tissues for mRNA expression.

20 Multiple Tissue Northern (MTN) blots containing various human tissues (H) or human immune system tissues (IM) (Clontech) are examined with the labeled probe using ExpressHyb™ hybridization solution (Clontech) according to manufacturer's protocol number PT1190-1. Following hybridization and washing, the blots are mounted and exposed to film at -70°C overnight, and the films developed
25 according to standard procedures.

Example 4: Chromosomal Mapping of the Polynucleotides

An oligonucleotide primer set is designed according to the sequence at the 5' end of SEQ ID NO:X. This primer preferably spans about 100 nucleotides. This
30 primer set is then used in a polymerase chain reaction under the following set of conditions : 30 seconds, 95°C; 1 minute, 56°C; 1 minute, 70°C. This cycle is repeated 32 times followed by one 5 minute cycle at 70°C. Human, mouse, and

hamster DNA is used as template in addition to a somatic cell hybrid panel containing individual chromosomes or chromosome fragments (Bios, Inc). The reactions is analyzed on either 8% polyacrylamide gels or 3.5 % agarose gels. Chromosome mapping is determined by the presence of an approximately 100 bp PCR fragment in the particular somatic cell hybrid.

Example 5: Bacterial Expression of a Polypeptide

A polynucleotide encoding a polypeptide of the present invention is amplified using PCR oligonucleotide primers corresponding to the 5' and 3' ends of the DNA sequence, as outlined in Example 1, to synthesize insertion fragments. The primers used to amplify the cDNA insert should preferably contain restriction sites, such as BamHI and XbaI, at the 5' end of the primers in order to clone the amplified product into the expression vector. For example, BamHI and XbaI correspond to the restriction enzyme sites on the bacterial expression vector pQE-9. (Qiagen, Inc., Chatsworth, CA). This plasmid vector encodes antibiotic resistance (Amp^r), a bacterial origin of replication (ori), an IPTG-regulatable promoter/operator (P/O), a ribosome binding site (RBS), a 6-histidine tag (6-His), and restriction enzyme cloning sites.

The pQE-9 vector is digested with BamHI and XbaI and the amplified fragment is ligated into the pQE-9 vector maintaining the reading frame initiated at the bacterial RBS. The ligation mixture is then used to transform the E. coli strain M15/rep4 (Qiagen, Inc.) which contains multiple copies of the plasmid pREP4, which expresses the lacI repressor and also confers kanamycin resistance (Kan^r). Transformants are identified by their ability to grow on LB plates and ampicillin/kanamycin resistant colonies are selected. Plasmid DNA is isolated and confirmed by restriction analysis.

Clones containing the desired constructs are grown overnight (O/N) in liquid culture in LB media supplemented with both Amp (100 ug/ml) and Kan (25 ug/ml). The O/N culture is used to inoculate a large culture at a ratio of 1:100 to 1:250. The cells are grown to an optical density 600 (O.D.⁶⁰⁰) of between 0.4 and 0.6. IPTG (Isopropyl-B-D-thiogalacto pyranoside) is then added to a final concentration of 1

mM. IPTG induces by inactivating the lacI repressor, clearing the P/O leading to increased gene expression.

Cells are grown for an extra 3 to 4 hours. Cells are then harvested by centrifugation (20 mins at 6000Xg). The cell pellet is solubilized in the chaotropic agent 6 Molar Guanidine HCl by stirring for 3-4 hours at 4°C. The cell debris is removed by centrifugation, and the supernatant containing the polypeptide is loaded onto a nickel-nitrilo-tri-acetic acid ("Ni-NTA") affinity resin column (available from QIAGEN, Inc., *supra*). Proteins with a 6 x His tag bind to the Ni-NTA resin with high affinity and can be purified in a simple one-step procedure (for details see: The QIAexpressionist (1995) QIAGEN, Inc., *supra*).

Briefly, the supernatant is loaded onto the column in 6 M guanidine-HCl, pH 8, the column is first washed with 10 volumes of 6 M guanidine-HCl, pH 8, then washed with 10 volumes of 6 M guanidine-HCl pH 6, and finally the polypeptide is eluted with 6 M guanidine-HCl, pH 5.

The purified protein is then renatured by dialyzing it against phosphate-buffered saline (PBS) or 50 mM Na-acetate, pH 6 buffer plus 200 mM NaCl. Alternatively, the protein can be successfully refolded while immobilized on the Ni-NTA column. The recommended conditions are as follows: renature using a linear 6M-1M urea gradient in 500 mM NaCl, 20% glycerol, 20 mM Tris/HCl pH 7.4, containing protease inhibitors. The renaturation should be performed over a period of 1.5 hours or more. After renaturation the proteins are eluted by the addition of 250 mM imidazole. Imidazole is removed by a final dialyzing step against PBS or 50 mM sodium acetate pH 6 buffer plus 200 mM NaCl. The purified protein is stored at 4°C or frozen at -80°C.

In addition to the above expression vector, the present invention further includes an expression vector comprising phage operator and promoter elements operatively linked to a polynucleotide of the present invention, called pHE4a. (ATCC Accession Number 209645, deposited on February 25, 1998.) This vector contains: 1) a neomycinphosphotransferase gene as a selection marker, 2) an E. coli origin of replication, 3) a T5 phage promoter sequence, 4) two lac operator sequences, 5) a Shine-Delgarno sequence, and 6) the lactose operon repressor gene (lacIq). The

origin of replication (oriC) is derived from pUC19 (LTI, Gaithersburg, MD). The promoter sequence and operator sequences are made synthetically.

- DNA can be inserted into the pHEa by restricting the vector with NdeI and XbaI, BamHI, XhoI, or Asp718, running the restricted product on a gel, and isolating the larger fragment (the stuffer fragment should be about 310 base pairs). The DNA insert is generated according to the PCR protocol described in Example 1, using PCR primers having restriction sites for NdeI (5' primer) and XbaI, BamHI, XhoI, or Asp718 (3' primer). The PCR insert is gel purified and restricted with compatible enzymes. The insert and vector are ligated according to standard protocols.
- The engineered vector could easily be substituted in the above protocol to express protein in a bacterial system.

Example 6: Purification of a Polypeptide from an Inclusion Body

- The following alternative method can be used to purify a polypeptide expressed in *E. coli* when it is present in the form of inclusion bodies. Unless otherwise specified, all of the following steps are conducted at 4-10°C.

- Upon completion of the production phase of the *E. coli* fermentation, the cell culture is cooled to 4-10°C and the cells harvested by continuous centrifugation at 15,000 rpm (Heraeus Sepatech). On the basis of the expected yield of protein per unit weight of cell paste and the amount of purified protein required, an appropriate amount of cell paste, by weight, is suspended in a buffer solution containing 100 mM Tris, 50 mM EDTA, pH 7.4. The cells are dispersed to a homogeneous suspension using a high shear mixer.

- The cells are then lysed by passing the solution through a microfluidizer (Microfluidics, Corp. or APV Gaulin, Inc.) twice at 4000-6000 psi. The homogenate is then mixed with NaCl solution to a final concentration of 0.5 M NaCl, followed by centrifugation at 7000 xg for 15 min. The resultant pellet is washed again using 0.5M NaCl, 100 mM Tris, 50 mM EDTA, pH 7.4.

- The resulting washed inclusion bodies are solubilized with 1.5 M guanidine hydrochloride (GuHCl) for 2-4 hours. After 7000 xg centrifugation for 15 min., the pellet is discarded and the polypeptide containing supernatant is incubated at 4°C overnight to allow further GuHCl extraction.

Following high speed centrifugation (30,000 xg) to remove insoluble particles, the GuHCl solubilized protein is refolded by quickly mixing the GuHCl extract with 20 volumes of buffer containing 50 mM sodium, pH 4.5, 150 mM NaCl, 2 mM EDTA by vigorous stirring. The refolded diluted protein solution is kept at 4°C without
5 mixing for 12 hours prior to further purification steps.

To clarify the refolded polypeptide solution, a previously prepared tangential filtration unit equipped with 0.16 µm membrane filter with appropriate surface area (e.g., Filtron), equilibrated with 40 mM sodium acetate, pH 6.0 is employed. The filtered sample is loaded onto a cation exchange resin (e.g., Poros HS-50, Perseptive
10 Biosystems). The column is washed with 40 mM sodium acetate, pH 6.0 and eluted with 250 mM, 500 mM, 1000 mM, and 1500 mM NaCl in the same buffer, in a stepwise manner. The absorbance at 280 nm of the effluent is continuously monitored. Fractions are collected and further analyzed by SDS-PAGE.

Fractions containing the polypeptide are then pooled and mixed with 4
15 volumes of water. The diluted sample is then loaded onto a previously prepared set of tandem columns of strong anion (Poros HQ-50, Perseptive Biosystems) and weak anion (Poros CM-20, Perseptive Biosystems) exchange resins. The columns are equilibrated with 40 mM sodium acetate, pH 6.0. Both columns are washed with 40 mM sodium acetate, pH 6.0, 200 mM NaCl. The CM-20 column is then eluted using
20 a 10 column volume linear gradient ranging from 0.2 M NaCl, 50 mM sodium acetate, pH 6.0 to 1.0 M NaCl, 50 mM sodium acetate, pH 6.5. Fractions are collected under constant A₂₈₀ monitoring of the effluent. Fractions containing the polypeptide (determined, for instance, by 16% SDS-PAGE) are then pooled.

The resultant polypeptide should exhibit greater than 95% purity after the
25 above refolding and purification steps. No major contaminant bands should be observed from Commassie blue stained 16% SDS-PAGE gel when 5 µg of purified protein is loaded. The purified protein can also be tested for endotoxin/LPS contamination, and typically the LPS content is less than 0.1 ng/ml according to LAL
assays.

30

Example 7: Cloning and Expression of a Polypeptide in a Baculovirus Expression System

In this example, the plasmid shuttle vector pA2 is used to insert a polynucleotide into a baculovirus to express a polypeptide. This expression vector contains the strong polyhedrin promoter of the *Autographa californica* nuclear polyhedrosis virus (AcMNPV) followed by convenient restriction sites such as BamHI, Xba I and Asp718. The polyadenylation site of the simian virus 40 ("SV40") is used for efficient polyadenylation. For easy selection of recombinant virus, the plasmid contains the beta-galactosidase gene from *E. coli* under control of a weak *Drosophila* promoter in the same orientation, followed by the polyadenylation signal of the polyhedrin gene. The inserted genes are flanked on both sides by viral sequences for cell-mediated homologous recombination with wild-type viral DNA to generate a viable virus that express the cloned polynucleotide.

Many other baculovirus vectors can be used in place of the vector above, such as pAc373, pVL941, and pAcIM1, as one skilled in the art would readily appreciate, as long as the construct provides appropriately located signals for transcription, translation, secretion and the like, including a signal peptide and an in-frame AUG as required. Such vectors are described, for instance, in Luckow et al., *Virology* 170:31-39 (1989).

Specifically, the cDNA sequence contained in the deposited clone, including the AUG initiation codon and the naturally associated leader sequence identified in Table 1, is amplified using the PCR protocol described in Example 1. If the naturally occurring signal sequence is used to produce the secreted protein, the pA2 vector does not need a second signal peptide. Alternatively, the vector can be modified (pA2 GP) to include a baculovirus leader sequence, using the standard methods described in Summers et al., "A Manual of Methods for Baculovirus Vectors and Insect Cell Culture Procedures," Texas Agricultural Experimental Station Bulletin No. 1555 (1987).

The amplified fragment is isolated from a 1% agarose gel using a commercially available kit ("GeneClean," BIO 101 Inc., La Jolla, Ca.). The fragment then is digested with appropriate restriction enzymes and again purified on a 1% agarose gel.

The plasmid is digested with the corresponding restriction enzymes and optionally, can be dephosphorylated using calf intestinal phosphatase, using routine procedures known in the art. The DNA is then isolated from a 1% agarose gel using a commercially available kit ("GeneClean" BIO 101 Inc., La Jolla, Ca.).

5 The fragment and the dephosphorylated plasmid are ligated together with T4 DNA ligase. *E. coli* HB101 or other suitable *E. coli* hosts such as XL-1 Blue (Stratagene Cloning Systems, La Jolla, CA) cells are transformed with the ligation mixture and spread on culture plates. Bacteria containing the plasmid are identified by digesting DNA from individual colonies and analyzing the digestion product by
10 gel electrophoresis. The sequence of the cloned fragment is confirmed by DNA sequencing.

Five µg of a plasmid containing the polynucleotide is co-transfected with 1.0 µg of a commercially available linearized baculovirus DNA ("BaculoGold™ baculovirus DNA", Pharmingen, San Diego, CA), using the lipofection method
15 described by Felgner et al., Proc. Natl. Acad. Sci. USA 84:7413-7417 (1987). One µg of BaculoGold™ virus DNA and 5 µg of the plasmid are mixed in a sterile well of a microtiter plate containing 50 µl of serum-free Grace's medium (Life Technologies Inc., Gaithersburg, MD). Afterwards, 10 µl Lipofectin plus 90 µl Grace's medium are added, mixed and incubated for 15 minutes at room temperature. Then the
20 transfection mixture is added drop-wise to Sf9 insect cells (ATCC CRL 1711) seeded in a 35 mm tissue culture plate with 1 ml Grace's medium without serum. The plate is then incubated for 5 hours at 27° C. The transfection solution is then removed from the plate and 1 ml of Grace's insect medium supplemented with 10% fetal calf serum is added. Cultivation is then continued at 27° C for four days.

25 After four days the supernatant is collected and a plaque assay is performed, as described by Summers and Smith, *supra*. An agarose gel with "Blue Gal" (Life Technologies Inc., Gaithersburg) is used to allow easy identification and isolation of gal-expressing clones, which produce blue-stained plaques. (A detailed description of a "plaque assay" of this type can also be found in the user's guide for insect cell
30 culture and baculovirology distributed by Life Technologies Inc., Gaithersburg, page 9-10.) After appropriate incubation, blue stained plaques are picked with the tip of a micropipettor (e.g., Eppendorf). The agar containing the recombinant viruses is then

resuspended in a microcentrifuge tube containing 200 µl of Grace's medium and the suspension containing the recombinant baculovirus is used to infect Sf9 cells seeded in 35 mm dishes. Four days later the supernatants of these culture dishes are harvested and then they are stored at 4° C.

5 To verify the expression of the polypeptide, Sf9 cells are grown in Grace's medium supplemented with 10% heat-inactivated FBS. The cells are infected with the recombinant baculovirus containing the polynucleotide at a multiplicity of infection ("MOI") of about 2. If radiolabeled proteins are desired, 6 hours later the medium is removed and is replaced with SF900 II medium minus methionine and
10 cysteine (available from Life Technologies Inc., Rockville, MD). After 42 hours, 5 µCi of ³⁵S-methionine and 5 µCi ³⁵S-cysteine (available from Amersham) are added. The cells are further incubated for 16 hours and then are harvested by centrifugation. The proteins in the supernatant as well as the intracellular proteins are analyzed by SDS-PAGE followed by autoradiography (if radiolabeled).

15 Microsequencing of the amino acid sequence of the amino terminus of purified protein may be used to determine the amino terminal sequence of the produced protein.

Example 8: Expression of a Polypeptide in Mammalian Cells

 The polypeptide of the present invention can be expressed in a mammalian
20 cell. A typical mammalian expression vector contains a promoter element, which mediates the initiation of transcription of mRNA, a protein coding sequence, and signals required for the termination of transcription and polyadenylation of the transcript. Additional elements include enhancers, Kozak sequences and intervening sequences flanked by donor and acceptor sites for RNA splicing. Highly efficient
25 transcription is achieved with the early and late promoters from SV40, the long terminal repeats (LTRs) from Retroviruses, e.g., RSV, HTLV, HIV and the early promoter of the cytomegalovirus (CMV). However, cellular elements can also be used (e.g., the human actin promoter).

 Suitable expression vectors for use in practicing the present invention include,
30 for example, vectors such as pSVL and pMSG (Pharmacia, Uppsala, Sweden), pRSVcat (ATCC 37152), pSV2dhfr (ATCC 37146), pBC12MI (ATCC 67109),

pCMVSPORT 2.0, and pCMVSPORT 3.0. Mammalian host cells that could be used include, human HeLa, 293, H9 and Jurkat cells, mouse NIH3T3 and C127 cells, Cos 1, Cos 7 and CV1, quail QC1-3 cells, mouse L cells and Chinese hamster ovary (CHO) cells.

- 5 Alternatively, the polypeptide can be expressed in stable cell lines containing the polynucleotide integrated into a chromosome. The co-transfection with a selectable marker such as dhfr, gpt, neomycin, hygromycin allows the identification and isolation of the transfected cells.

- 10 The transfected gene can also be amplified to express large amounts of the encoded protein. The DHFR (dihydrofolate reductase) marker is useful in developing cell lines that carry several hundred or even several thousand copies of the gene of interest. (See, e.g., Alt, F. W., et al., *J. Biol. Chem.* 253:1357-1370 (1978); Hamlin, J. L. and Ma, C., *Biochem. et Biophys. Acta.* 1097:107-143 (1990); Page, M. J. and Sydenham, M. A., *Biotechnology* 9:64-68 (1991).) Another useful selection marker
15 is the enzyme glutamine synthase (GS) (Murphy et al., *Biochem J.* 227:277-279 (1991); Bebbington et al., *Bio/Technology* 10:169-175 (1992). Using these markers, the mammalian cells are grown in selective medium and the cells with the highest resistance are selected. These cell lines contain the amplified gene(s) integrated into a chromosome. Chinese hamster ovary (CHO) and NSO cells are often used for the
20 production of proteins.

- Derivatives of the plasmid pSV2-dhfr (ATCC Accession No. 37146), the expression vectors pC4 (ATCC Accession No. 209646) and pC6 (ATCC Accession No. 209647) contain the strong promoter (LTR) of the Rous Sarcoma Virus (Cullen et al., *Molecular and Cellular Biology*, 438-447 (March, 1985)) plus a fragment of the
25 CMV-enhancer (Boshart et al., *Cell* 41:521-530 (1985).) Multiple cloning sites, e.g., with the restriction enzyme cleavage sites BamHI, XbaI and Asp718, facilitate the cloning of the gene of interest. The vectors also contain the 3' intron, the polyadenylation and termination signal of the rat preproinsulin gene, and the mouse DHFR gene under control of the SV40 early promoter.

- 30 Specifically, the plasmid pC6, for example, is digested with appropriate restriction enzymes and then dephosphorylated using calf intestinal phosphates by procedures known in the art. The vector is then isolated from a 1% agarose gel.

A polynucleotide of the present invention is amplified according to the protocol outlined in Example 1. If the naturally occurring signal sequence is used to produce the secreted protein, the vector does not need a second signal peptide. Alternatively, if the naturally occurring signal sequence is not used, the vector can be modified to include a heterologous signal sequence. (See, e.g., WO 96/34891.)

The amplified fragment is isolated from a 1% agarose gel using a commercially available kit ("GeneClean," BIO 101 Inc., La Jolla, Ca.). The fragment then is digested with appropriate restriction enzymes and again purified on a 1% agarose gel.

The amplified fragment is then digested with the same restriction enzyme and purified on a 1% agarose gel. The isolated fragment and the dephosphorylated vector are then ligated with T4 DNA ligase. *E. coli* HB101 or XL-1 Blue cells are then transformed and bacteria are identified that contain the fragment inserted into plasmid pC6 using, for instance, restriction enzyme analysis.

Chinese hamster ovary cells lacking an active DHFR gene is used for transfection. Five μ g of the expression plasmid pC6 is cotransfected with 0.5 μ g of the plasmid pSVneo using lipofectin (Felgner et al., *supra*). The plasmid pSV2-neo contains a dominant selectable marker, the *neo* gene from Tn5 encoding an enzyme that confers resistance to a group of antibiotics including G418. The cells are seeded in alpha minus MEM supplemented with 1 mg/ml G418. After 2 days, the cells are trypsinized and seeded in hybridoma cloning plates (Greiner, Germany) in alpha minus MEM supplemented with 10, 25, or 50 ng/ml of methotrexate plus 1 mg/ml G418. After about 10-14 days single clones are trypsinized and then seeded in 6-well petri dishes or 10 ml flasks using different concentrations of methotrexate (50 nM, 100 nM, 200 nM, 400 nM, 800 nM). Clones growing at the highest concentrations of methotrexate are then transferred to new 6-well plates containing even higher concentrations of methotrexate (1 μ M, 2 μ M, 5 μ M, 10 mM, 20 mM). The same procedure is repeated until clones are obtained which grow at a concentration of 100 - 200 μ M. Expression of the desired gene product is analyzed, for instance, by SDS-PAGE and Western blot or by reversed phase HPLC analysis.

Example 9: Protein Fusions

The polypeptides of the present invention are preferably fused to other proteins. These fusion proteins can be used for a variety of applications. For example, fusion of the present polypeptides to His-tag, HA-tag, protein A, IgG domains, and maltose binding protein facilitates purification. (See Example 5; see also EP A 394,827; Traunecker, et al., Nature 331:84-86 (1988).) Similarly, fusion to IgG-1, IgG-3, and albumin increases the halflife time in vivo. Nuclear localization signals fused to the polypeptides of the present invention can target the protein to a specific subcellular localization, while covalent heterodimer or homodimers can increase or decrease the activity of a fusion protein. Fusion proteins can also create chimeric molecules having more than one function. Finally, fusion proteins can increase solubility and/or stability of the fused protein compared to the non-fused protein. All of the types of fusion proteins described above can be made by modifying the following protocol, which outlines the fusion of a polypeptide to an IgG molecule, or the protocol described in Example 5.

Briefly, the human Fc portion of the IgG molecule can be PCR amplified, using primers that span the 5' and 3' ends of the sequence described below. These primers also should have convenient restriction enzyme sites that will facilitate cloning into an expression vector, preferably a mammalian expression vector.

For example, if pC4 (Accession No. 209646) is used, the human Fc portion can be ligated into the BamHI cloning site. Note that the 3' BamHI site should be destroyed. Next, the vector containing the human Fc portion is re-restricted with BamHI, linearizing the vector, and a polynucleotide of the present invention, isolated by the PCR protocol described in Example 1, is ligated into this BamHI site. Note that the polynucleotide is cloned without a stop codon, otherwise a fusion protein will not be produced.

If the naturally occurring signal sequence is used to produce the secreted protein, pC4 does not need a second signal peptide. Alternatively, if the naturally occurring signal sequence is not used, the vector can be modified to include a heterologous signal sequence. (See, e.g., WO 96/34891.)

Human IgG Fc region:

GGGATCCGGAGCCCAAATCTTCTGACAAAACCTCACACATGCCCACCGTGC
CCAGCACCTGAATTCGAGGGTGCACCGTCAGTCTTCCTCTTCCCCCAAAA
CCCAAGGACACCCTCATGATCTCCCGGACTCCTGAGGTCACATGCGTGGT
GGTGGACGTAAGCCACGAAGACCCTGAGGTCAAGTTCAACTGGTACGTGG
5 ACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGGAGCAGTA
CAACAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACT
GGCTGAATGGCAAGGAGTACAAGTGCAAGGTCTCCAACAAAGCCCTCCCA
ACCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAAC
CACAGGTGTACACCCTGCCCCCATCCCGGGATGAGCTGACCAAGAACCAG
10 GTCAGCCTGACCTGCCTGGTCAAAGGCTTCTATCCAAGCGACATCGCCGT
GGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACACTACAAGACCACGCCT
CCCGTGCTGGACTCCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTG
GACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTCATGCTCCGTGATGCA
TGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGG
15 GTAAATGAGTGCGACGGCCGCGACTCTAGAGGAT (SEQ ID NO:1)

Example 10: Production of an Antibody from a Polypeptide

The antibodies of the present invention can be prepared by a variety of methods. (See, Current Protocols, Chapter 2.) For example, cells expressing a polypeptide of the present invention is administered to an animal to induce the production of sera containing polyclonal antibodies. In a preferred method, a preparation of the secreted protein is prepared and purified to render it substantially free of natural contaminants. Such a preparation is then introduced into an animal in order to produce polyclonal antisera of greater specific activity.

25 In the most preferred method, the antibodies of the present invention are monoclonal antibodies (or protein binding fragments thereof). Such monoclonal antibodies can be prepared using hybridoma technology. (Köhler et al., Nature 256:495 (1975); Köhler et al., Eur. J. Immunol. 6:511 (1976); Köhler et al., Eur. J. Immunol. 6:292 (1976); Hammerling et al., in: Monoclonal Antibodies and T-Cell Hybridomas, Elsevier, N.Y., pp. 563-681 (1981).) In general, such procedures involve immunizing an animal (preferably a mouse) with polypeptide or, more preferably, with a secreted polypeptide-expressing cell. Such cells may be cultured in

any suitable tissue culture medium; however, it is preferable to culture cells in Earle's modified Eagle's medium supplemented with 10% fetal bovine serum (inactivated at about 56°C), and supplemented with about 10 g/l of nonessential amino acids, about 1,000 U/ml of penicillin, and about 100 µg/ml of streptomycin.

5 The splenocytes of such mice are extracted and fused with a suitable myeloma cell line. Any suitable myeloma cell line may be employed in accordance with the present invention; however, it is preferable to employ the parent myeloma cell line (SP2O), available from the ATCC. After fusion, the resulting hybridoma cells are selectively maintained in HAT medium, and then cloned by limiting dilution as
10 described by Wands et al. (Gastroenterology 80:225-232 (1981).) The hybridoma cells obtained through such a selection are then assayed to identify clones which secrete antibodies capable of binding the polypeptide.

 Alternatively, additional antibodies capable of binding to the polypeptide can be produced in a two-step procedure using anti-idiotypic antibodies. Such a method
15 makes use of the fact that antibodies are themselves antigens, and therefore, it is possible to obtain an antibody which binds to a second antibody. In accordance with this method, protein specific antibodies are used to immunize an animal, preferably a mouse. The splenocytes of such an animal are then used to produce hybridoma cells, and the hybridoma cells are screened to identify clones which produce an antibody
20 whose ability to bind to the protein-specific antibody can be blocked by the polypeptide. Such antibodies comprise anti-idiotypic antibodies to the protein-specific antibody and can be used to immunize an animal to induce formation of further protein-specific antibodies.

 It will be appreciated that Fab and F(ab')₂ and other fragments of the
25 antibodies of the present invention may be used according to the methods disclosed herein. Such fragments are typically produced by proteolytic cleavage, using enzymes such as papain (to produce Fab fragments) or pepsin (to produce F(ab')₂ fragments). Alternatively, secreted protein-binding fragments can be produced through the application of recombinant DNA technology or through synthetic
30 chemistry.

 For in vivo use of antibodies in humans, it may be preferable to use "humanized" chimeric monoclonal antibodies. Such antibodies can be produced

using genetic constructs derived from hybridoma cells producing the monoclonal antibodies described above. Methods for producing chimeric antibodies are known in the art. (See, for review, Morrison, Science 229:1202 (1985); Oi et al., BioTechniques 4:214 (1986); Cabilly et al., U.S. Patent No. 4,816,567; Taniguchi et al., EP 171496; Morrison et al., EP 173494; Neuberger et al., WO 8601533; Robinson et al., WO 8702671; Boulianne et al., Nature 312:643 (1984); Neuberger et al., Nature 314:268 (1985).)

Example 11: Production Of Secreted Protein For High-Throughput Screening

Assays

The following protocol produces a supernatant containing a polypeptide to be tested. This supernatant can then be used in the Screening Assays described in Examples 13-20.

First, dilute Poly-D-Lysine (644 587 Boehringer-Mannheim) stock solution (1mg/ml in PBS) 1:20 in PBS (w/o calcium or magnesium 17-516F Biowhittaker) for a working solution of 50ug/ml. Add 200 ul of this solution to each well (24 well plates) and incubate at RT for 20 minutes. Be sure to distribute the solution over each well (note: a 12-channel pipetter may be used with tips on every other channel). Aspirate off the Poly-D-Lysine solution and rinse with 1ml PBS (Phosphate Buffered Saline). The PBS should remain in the well until just prior to plating the cells and plates may be poly-lysine coated in advance for up to two weeks.

Plate 293T cells (do not carry cells past P+20) at 2×10^5 cells/well in .5ml DMEM(Dulbecco's Modified Eagle Medium)(with 4.5 G/L glucose and L-glutamine (12-604F Biowhittaker))/10% heat inactivated FBS(14-503F Biowhittaker)/1x Penstrep(17-602E Biowhittaker). Let the cells grow overnight.

The next day, mix together in a sterile solution basin: 300 ul Lipofectamine (18324-012 Gibco/BRL) and 5ml Optimem I (31985070 Gibco/BRL)/96-well plate. With a small volume multi-channel pipetter, aliquot approximately 2ug of an expression vector containing a polynucleotide insert, produced by the methods described in Examples 8 or 9, into an appropriately labeled 96-well round bottom plate. With a multi-channel pipetter, add 50ul of the Lipofectamine/Optimem I mixture to each well. Pipette up and down gently to mix. Incubate at RT 15-45

minutes. After about 20 minutes, use a multi-channel pipetter to add 150ul Optimem I to each well. As a control, one plate of vector DNA lacking an insert should be transfected with each set of transfections.

Preferably, the transfection should be performed by tag-teaming the following tasks. By tag-teaming, hands on time is cut in half, and the cells do not spend too much time on PBS. First, person A aspirates off the media from four 24-well plates of cells, and then person B rinses each well with .5-1ml PBS. Person A then aspirates off PBS rinse, and person B, using a 12-channel pipetter with tips on every other channel, adds the 200ul of DNA/Lipofectamine/Optimem I complex to the odd wells first, then to the even wells, to each row on the 24-well plates. Incubate at 37°C for 6 hours.

While cells are incubating, prepare appropriate media, either 1%BSA in DMEM with 1x penstrep, or CHO-5 media (116.6 mg/L of CaCl₂ (anhyd); 0.00130 mg/L CuSO₄·5H₂O; 0.050 mg/L of Fe(NO₃)₃·9H₂O; 0.417 mg/L of FeSO₄·7H₂O; 311.80 mg/L of KCl; 28.64 mg/L of MgCl₂; 48.84 mg/L of MgSO₄; 6995.50 mg/L of NaCl; 2400.0 mg/L of NaHCO₃; 62.50 mg/L of NaH₂PO₄·H₂O; 71.02 mg/L of Na₂HPO₄; 4320 mg/L of ZnSO₄·7H₂O; .002 mg/L of Arachidonic Acid ; 1.022 mg/L of Cholesterol; .070 mg/L of DL-alpha-Tocopherol-Acetate; 0.0520 mg/L of Linoleic Acid; 0.010 mg/L of Linolenic Acid; 0.010 mg/L of Myristic Acid; 0.010 mg/L of Oleic Acid; 0.010 mg/L of Palmitic Acid; 0.010 mg/L of Palmitic Acid; 100 mg/L of Pluronic F-68; 0.010 mg/L of Stearic Acid; 2.20 mg/L of Tween 80; 4551 mg/L of D-Glucose; 130.85 mg/ml of L- Alanine; 147.50 mg/ml of L-Arginine-HCL; 7.50 mg/ml of L-Asparagine-H₂O; 6.65 mg/ml of L-Aspartic Acid; 29.56 mg/ml of L-Cystine-2HCL-H₂O; 31.29 mg/ml of L-Cystine-2HCL; 7.35 mg/ml of L-Glutamic Acid; 365.0 mg/ml of L-Glutamine; 18.75 mg/ml of Glycine; 52.48 mg/ml of L-Histidine-HCL-H₂O; 106.97 mg/ml of L-Isoleucine; 111.45 mg/ml of L-Leucine; 163.75 mg/ml of L-Lysine HCL; 32.34 mg/ml of L-Methionine; 68.48 mg/ml of L-Phenylalanine; 40.0 mg/ml of L-Proline; 26.25 mg/ml of L-Serine; 101.05 mg/ml of L-Threonine; 19.22 mg/ml of L-Tryptophan; 91.79 mg/ml of L-Tyrosine-2Na-2H₂O; 99.65 mg/ml of L-Valine; 0.0035 mg/L of Biotin; 3.24 mg/L of D-Ca Pantothenate; 11.78 mg/L of Choline Chloride; 4.65 mg/L of Folic Acid; 15.60 mg/L of i-Inositol; 3.02 mg/L of Niacinamide; 3.00 mg/L of Pyridoxal HCL; 0.031 mg/L of Pyridoxine HCL; 0.319

mg/L of Riboflavin; 3.17 mg/L of Thiamine HCL; 0.365 mg/L of Thymidine; and 0.680 mg/L of Vitamin B₁₂; 25 mM of HEPES Buffer; 2.39 mg/L of Na Hypoxanthine; 0.105 mg/L of Lipoic Acid; 0.081 mg/L of Sodium Putrescine-2HCL; 55.0 mg/L of Sodium Pyruvate; 0.0067 mg/L of Sodium Selenite; 20uM of Ethanolamine; 0.122 mg/L of Ferric Citrate; 41.70 mg/L of Methyl-B-Cyclodextrin complexed with Linoleic Acid; 33.33 mg/L of Methyl-B-Cyclodextrin complexed with Oleic Acid; and 10 mg/L of Methyl-B-Cyclodextrin complexed with Retinal) with 2mm glutamine and 1x penstrep. (BSA (81-068-3 Bayer) 100gm dissolved in 1L DMEM for a 10% BSA stock solution). Filter the media and collect 50 ul for endotoxin assay in 15ml polystyrene conical.

The transfection reaction is terminated, preferably by tag-teaming, at the end of the incubation period. Person A aspirates off the transfection media, while person B adds 1.5ml appropriate media to each well. Incubate at 37°C for 45 or 72 hours depending on the media used: 1%BSA for 45 hours or CHO-5 for 72 hours.

On day four, using a 300ul multichannel pipetter, aliquot 600ul in one 1ml deep well plate and the remaining supernatant into a 2ml deep well. The supernatants from each well can then be used in the assays described in Examples 13-20.

It is specifically understood that when activity is obtained in any of the assays described below using a supernatant, the activity originates from either the polypeptide directly (e.g., as a secreted protein) or by the polypeptide inducing expression of other proteins, which are then secreted into the supernatant. Thus, the invention further provides a method of identifying the protein in the supernatant characterized by an activity in a particular assay.

Example 12: Construction of GAS Reporter Construct

One signal transduction pathway involved in the differentiation and proliferation of cells is called the Jaks-STATs pathway. Activated proteins in the Jaks-STATs pathway bind to gamma activation site "GAS" elements or interferon-sensitive responsive element ("ISRE"), located in the promoter of many genes. The binding of a protein to these elements alter the expression of the associated gene.

GAS and ISRE elements are recognized by a class of transcription factors called Signal Transducers and Activators of Transcription, or "STATs." There are six members of the STATs family. Stat1 and Stat3 are present in many cell types, as is Stat2 (as response to IFN-alpha is widespread). Stat4 is more restricted and is not in many cell types though it has been found in T helper class I, cells after treatment with IL-12. Stat5 was originally called mammary growth factor, but has been found at higher concentrations in other cells including myeloid cells. It can be activated in tissue culture cells by many cytokines.

The STATs are activated to translocate from the cytoplasm to the nucleus upon tyrosine phosphorylation by a set of kinases known as the Janus Kinase ("Jaks") family. Jaks represent a distinct family of soluble tyrosine kinases and include Tyk2, Jak1, Jak2, and Jak3. These kinases display significant sequence similarity and are generally catalytically inactive in resting cells.

The Jaks are activated by a wide range of receptors summarized in the Table below. (Adapted from review by Schidler and Darnell, Ann. Rev. Biochem. 64:621-51 (1995).) A cytokine receptor family, capable of activating Jaks, is divided into two groups: (a) Class 1 includes receptors for IL-2, IL-3, IL-4, IL-6, IL-7, IL-9, IL-11, IL-12, IL-15, Epo, PRL, GH, G-CSF, GM-CSF, LIF, CNTF, and thrombopoietin; and (b) Class 2 includes IFN-a, IFN-g, and IL-10. The Class 1 receptors share a conserved cysteine motif (a set of four conserved cysteines and one tryptophan) and a WSXWS motif (a membrane proximal region encoding Trp-Ser-Xxx-Trp-Ser (SEQ ID NO:2)).

Thus, on binding of a ligand to a receptor, Jaks are activated, which in turn activate STATs, which then translocate and bind to GAS elements. This entire process is encompassed in the Jaks-STATs signal transduction pathway.

Therefore, activation of the Jaks-STATs pathway, reflected by the binding of the GAS or the ISRE element, can be used to indicate proteins involved in the proliferation and differentiation of cells. For example, growth factors and cytokines are known to activate the Jaks-STATs pathway. (See Table below.) Thus, by using GAS elements linked to reporter molecules, activators of the Jaks-STATs pathway can be identified.

	<u>Ligand</u>	<u>tyk2</u>	<u>JAKs</u> <u>Jak1</u>	<u>Jak2</u>	<u>Jak3</u>	<u>STATS</u>	<u>GAS(elements) or ISRE</u>
	<u>IFN family</u>						
5	IFN-a/B	+	+	-	-	1,2,3	ISRE
	IFN-g		+	+	-	1	GAS (IRF1>Lys6>IFP)
	IL-10	+	?	?	-	1,3	
	<u>gp130 family</u>						
10	IL-6 (Pleiotrophic)	+	+	+	?	1,3	GAS (IRF1>Lys6>IFP)
	IL-11(Pleiotrophic)	?	+	?	?	1,3	
	OnM(Pleiotrophic)	?	+	+	?	1,3	
	LIF(Pleiotrophic)	?	+	+	?	1,3	
	CNTF(Pleiotrophic)	-/+	+	+	?	1,3	
15	G-CSF(Pleiotrophic)	?	+	?	?	1,3	
	IL-12(Pleiotrophic)	+	-	+	+	1,3	
	<u>g-C family</u>						
	IL-2 (lymphocytes)	-	+	-	+	1,3,5	GAS
20	IL-4 (lymph/myeloid)	-	+	-	+	6	GAS (IRF1 = IFP >>Ly6)(IgH)
	IL-7 (lymphocytes)	-	+	-	+	5	GAS
	IL-9 (lymphocytes)	-	+	-	+	5	GAS
	IL-13 (lymphocyte)	-	+	?	?	6	GAS
	IL-15	?	+	?	+	5	GAS
25	<u>gp140 family</u>						
	IL-3 (myeloid)	-	-	+	-	5	GAS (IRF1>IFP>>Ly6)
	IL-5 (myeloid)	-	-	+	-	5	GAS
	GM-CSF (myeloid)	-	-	+	-	5	GAS
30	<u>Growth hormone family</u>						
	GH	?	-	+	-	5	
	PRL	?	+/-	+	-	1,3,5	
	EPO	?	-	+	-	5	GAS(B-CAS>IRF1=IFP>>Ly6)
35	<u>Receptor Tyrosine Kinases</u>						
	EGF	?	+	+	-	1,3	GAS (IRF1)
	PDGF	?	+	+	-	1,3	
	CSF-1	?	+	+	-	1,3	GAS (not IRF1)
40							

To construct a synthetic GAS containing promoter element, which is used in the Biological Assays described in Examples 13-14, a PCR based strategy is employed to generate a GAS-SV40 promoter sequence. The 5' primer contains four tandem copies of the GAS binding site found in the IRF1 promoter and previously demonstrated to bind STATs upon induction with a range of cytokines (Rothman et al., Immunity 1:457-468 (1994).), although other GAS or ISRE elements can be used instead. The 5' primer also contains 18bp of sequence complementary to the SV40 early promoter sequence and is flanked with an XhoI site. The sequence of the 5' primer is:

10 5':GCGCCTCGAGATTTCCTCCGAAATCTAGATTTCCTCCGAAATGATTTCCTCCGAAATGATTTCCTCCGAAATATCTGCCATCTCAATTAG:3' (SEQ ID NO:3)

The downstream primer is complementary to the SV40 promoter and is flanked with a Hind III site: 5':GCGGCAAGCTTTTGGCAAAGCCTAGGC:3' (SEQ ID NO:4)

15 PCR amplification is performed using the SV40 promoter template present in the B-gal:promoter plasmid obtained from Clontech. The resulting PCR fragment is digested with XhoI/Hind III and subcloned into BLSK2-. (Stratagene.) Sequencing with forward and reverse primers confirms that the insert contains the following sequence:

20 5':CTCGAGATTTCCTCCGAAATCTAGATTTCCTCCGAAATGATTTCCTCCGAAATGATTTCCTCCGAAATATCTGCCATCTCAATTAGTCAGCAACCATAGTCCCGCCCTAACTCCGCCCATCCCGCCCTAACTCCGCCAGTTCCGCCATTCTCCGCCCCATGGCTGACTAATTTTTTTTATTTATGCAGAGGCCGAGGCCGCCTCGGCCTCTGAGCTATTCCAGAAGTAGTGAGGAGGCTTTTTTGGAGGCCT
25 AGGCTTTTGGCAAAGCTT:3' (SEQ ID NO:5)

With this GAS promoter element linked to the SV40 promoter, a GAS:SEAP2 reporter construct is next engineered. Here, the reporter molecule is a secreted alkaline phosphatase, or "SEAP." Clearly, however, any reporter molecule can be instead of SEAP, in this or in any of the other Examples. Well known reporter
30 molecules that can be used instead of SEAP include chloramphenicol acetyltransferase (CAT), luciferase, alkaline phosphatase, B-galactosidase, green fluorescent protein (GFP), or any protein detectable by an antibody.

The above sequence confirmed synthetic GAS-SV40 promoter element is subcloned into the pSEAP-Promoter vector obtained from Clontech using HindIII and XhoI, effectively replacing the SV40 promoter with the amplified GAS:SV40 promoter element, to create the GAS-SEAP vector. However, this vector does not contain a neomycin resistance gene, and therefore, is not preferred for mammalian expression systems.

Thus, in order to generate mammalian stable cell lines expressing the GAS-SEAP reporter, the GAS-SEAP cassette is removed from the GAS-SEAP vector using SalI and NotI, and inserted into a backbone vector containing the neomycin resistance gene, such as pGFP-1 (Clontech), using these restriction sites in the multiple cloning site, to create the GAS-SEAP/Neo vector. Once this vector is transfected into mammalian cells, this vector can then be used as a reporter molecule for GAS binding as described in Examples 13-14.

Other constructs can be made using the above description and replacing GAS with a different promoter sequence. For example, construction of reporter molecules containing NFK-B and EGR promoter sequences are described in Examples 15 and 16. However, many other promoters can be substituted using the protocols described in these Examples. For instance, SRE, IL-2, NFAT, or Osteocalcin promoters can be substituted, alone or in combination (e.g., GAS/NF-KB/EGR, GAS/NF-KB, IL-2/NFAT, or NF-KB/GAS). Similarly, other cell lines can be used to test reporter construct activity, such as HELA (epithelial), HUVEC (endothelial), Reh (B-cell), Saos-2 (osteoblast), HUVAC (aortic), or Cardiomyocyte.

Example 13: High-Throughput Screening Assay for T-cell Activity.

The following protocol is used to assess T-cell activity by identifying factors, such as growth factors and cytokines, that may proliferate or differentiate T-cells. T-cell activity is assessed using the GAS/SEAP/Neo construct produced in Example 12. Thus, factors that increase SEAP activity indicate the ability to activate the Jaks-STATS signal transduction pathway. The T-cell used in this assay is Jurkat T-cells (ATCC Accession No. TIB-152), although Molt-3 cells (ATCC Accession No. CRL-1552) and Molt-4 cells (ATCC Accession No. CRL-1582) cells can also be used.

Jurkat T-cells are lymphoblastic CD4+ Th1 helper cells. In order to generate stable cell lines, approximately 2 million Jurkat cells are transfected with the GAS-SEAP/neo vector using DMRIE-C (Life Technologies)(transfection procedure described below). The transfected cells are seeded to a density of approximately
5 20,000 cells per well and transfectants resistant to 1 mg/ml gentamicin selected. Resistant colonies are expanded and then tested for their response to increasing concentrations of interferon gamma. The dose response of a selected clone is demonstrated.

Specifically, the following protocol will yield sufficient cells for 75 wells
10 containing 200 ul of cells. Thus, it is either scaled up, or performed in multiple to generate sufficient cells for multiple 96 well plates. Jurkat cells are maintained in RPMI + 10% serum with 1%Pen-Strep. Combine 2.5 mls of OPTI-MEM (Life Technologies) with 10 ug of plasmid DNA in a T25 flask. Add 2.5 ml OPTI-MEM containing 50 ul of DMRIE-C and incubate at room temperature for 15-45 mins.

15 During the incubation period, count cell concentration, spin down the required number of cells (10^7 per transfection), and resuspend in OPTI-MEM to a final concentration of 10^7 cells/ml. Then add 1ml of 1×10^7 cells in OPTI-MEM to T25 flask and incubate at 37°C for 6 hrs. After the incubation, add 10 ml of RPMI + 15% serum.

20 The Jurkat:GAS-SEAP stable reporter lines are maintained in RPMI + 10% serum, 1 mg/ml Gentamicin, and 1% Pen-Strep. These cells are treated with supernatants containing a polypeptide as produced by the protocol described in Example 11.

On the day of treatment with the supernatant, the cells should be washed and
25 resuspended in fresh RPMI + 10% serum to a density of 500,000 cells per ml. The exact number of cells required will depend on the number of supernatants being screened. For one 96 well plate, approximately 10 million cells (for 10 plates, 100 million cells) are required.

Transfer the cells to a triangular reservoir boat, in order to dispense the cells
30 into a 96 well dish, using a 12 channel pipette. Using a 12 channel pipette, transfer 200 ul of cells into each well (therefore adding 100,000 cells per well).

After all the plates have been seeded, 50 ul of the supernatants are transferred directly from the 96 well plate containing the supernatants into each well using a 12 channel pipette. In addition, a dose of exogenous interferon gamma (0.1, 1.0, 10 ng) is added to wells H9, H10, and H11 to serve as additional positive controls for the
5 assay.

The 96 well dishes containing Jurkat cells treated with supernatants are placed in an incubator for 48 hrs (note: this time is variable between 48-72 hrs). 35 ul samples from each well are then transferred to an opaque 96 well plate using a 12 channel pipette. The opaque plates should be covered (using sellophene covers) and
10 stored at -20°C until SEAP assays are performed according to Example 17. The plates containing the remaining treated cells are placed at 4°C and serve as a source of material for repeating the assay on a specific well if desired.

As a positive control, 100 Unit/ml interferon gamma can be used which is known to activate Jurkat T cells. Over 30 fold induction is typically observed in the
15 positive control wells.

The above protocol may be used in the generation of both transient, as well as, stable transfected cells, which would be apparent to those of skill in the art.

Example 14: High-Throughput Screening Assay Identifying Myeloid Activity

20 The following protocol is used to assess myeloid activity by identifying factors, such as growth factors and cytokines, that may proliferate or differentiate myeloid cells. Myeloid cell activity is assessed using the GAS/SEAP/Neo construct produced in Example 12. Thus, factors that increase SEAP activity indicate the ability to activate the Jaks-STATS signal transduction pathway. The myeloid cell
25 used in this assay is U937, a pre-monocyte cell line, although TF-1, HL60, or KG1 can be used.

To transiently transfect U937 cells with the GAS/SEAP/Neo construct produced in Example 12, a DEAE-Dextran method (Kharbanda et. al., 1994, Cell Growth & Differentiation, 5:259-265) is used. First, harvest 2×10^7 U937 cells and
30 wash with PBS. The U937 cells are usually grown in RPMI 1640 medium containing

10% heat-inactivated fetal bovine serum (FBS) supplemented with 100 units/ml penicillin and 100 mg/ml streptomycin.

Next, suspend the cells in 1 ml of 20 mM Tris-HCl (pH 7.4) buffer containing 0.5 mg/ml DEAE-Dextran, 8 ug GAS-SEAP2 plasmid DNA, 140 mM NaCl, 5 mM
5 KCl, 375 uM Na₂HPO₄·7H₂O, 1 mM MgCl₂, and 675 uM CaCl₂. Incubate at 37°C for 45 min.

Wash the cells with RPMI 1640 medium containing 10% FBS and then resuspend in 10 ml complete medium and incubate at 37°C for 36 hr.

The GAS-SEAP/U937 stable cells are obtained by growing the cells in 400
10 ug/ml G418. The G418-free medium is used for routine growth but every one to two months, the cells should be re-grown in 400 ug/ml G418 for couple of passages.

These cells are tested by harvesting 1×10^8 cells (this is enough for ten 96-well plates assay) and wash with PBS. Suspend the cells in 200 ml above described growth medium, with a final density of 5×10^5 cells/ml. Plate 200 ul cells per well in
15 the 96-well plate (or 1×10^5 cells/well).

Add 50 ul of the supernatant prepared by the protocol described in Example 11. Incubate at 37°C for 48 to 72 hr. As a positive control, 100 Unit/ml interferon gamma can be used which is known to activate U937 cells. Over 30 fold induction is typically observed in the positive control wells. SEAP assay the supernatant
20 according to the protocol described in Example 17.

Example 15: High-Throughput Screening Assay Identifying Neuronal Activity.

When cells undergo differentiation and proliferation, a group of genes are activated through many different signal transduction pathways. One of these genes,
25 EGR1 (early growth response gene 1), is induced in various tissues and cell types upon activation. The promoter of EGR1 is responsible for such induction. Using the EGR1 promoter linked to reporter molecules, activation of cells can be assessed.

Particularly, the following protocol is used to assess neuronal activity in PC12 cell lines. PC12 cells (rat phenochromocytoma cells) are known to proliferate and/or
30 differentiate by activation with a number of mitogens, such as TPA (tetradecanoyl phorbol acetate), NGF (nerve growth factor), and EGF (epidermal growth factor).

The EGR1 gene expression is activated during this treatment. Thus, by stably transfecting PC12 cells with a construct containing an EGR promoter linked to SEAP reporter, activation of PC12 cells can be assessed.

The EGR/SEAP reporter construct can be assembled by the following protocol. The EGR-1 promoter sequence (-633 to +1)(Sakamoto K et al., Oncogene 6:867-871 (1991)) can be PCR amplified from human genomic DNA using the following primers:

5' GCGCTCGAGGGATGACAGCGATAGAACCCCGG -3' (SEQ ID NO:6)

5' GCGAAGCTTCGCGACTCCCCGGATCCGCCTC-3' (SEQ ID NO:7)

Using the GAS:SEAP/Neo vector produced in Example 12, EGR1 amplified product can then be inserted into this vector. Linearize the GAS:SEAP/Neo vector using restriction enzymes XhoI/HindIII, removing the GAS/SV40 stuffer. Restrict the EGR1 amplified product with these same enzymes. Ligate the vector and the EGR1 promoter.

To prepare 96 well-plates for cell culture, two mls of a coating solution (1:30 dilution of collagen type I (Upstate Biotech Inc. Cat#08-115) in 30% ethanol (filter sterilized)) is added per one 10 cm plate or 50 ml per well of the 96-well plate, and allowed to air dry for 2 hr.

PC12 cells are routinely grown in RPMI-1640 medium (Bio Whittaker) containing 10% horse serum (JRH BIOSCIENCES, Cat. # 12449-78P), 5% heat-inactivated fetal bovine serum (FBS) supplemented with 100 units/ml penicillin and 100 ug/ml streptomycin on a precoated 10 cm tissue culture dish. One to four split is done every three to four days. Cells are removed from the plates by scraping and resuspended with pipetting up and down for more than 15 times.

Transfect the EGR/SEAP/Neo construct into PC12 using the Lipofectamine protocol described in Example 11. EGR-SEAP/PC12 stable cells are obtained by growing the cells in 300 ug/ml G418. The G418-free medium is used for routine growth but every one to two months, the cells should be re-grown in 300 ug/ml G418 for couple of passages.

To assay for neuronal activity, a 10 cm plate with cells around 70 to 80% confluent is screened by removing the old medium. Wash the cells once with PBS

(Phosphate buffered saline). Then starve the cells in low serum medium (RPMI-1640 containing 1% horse serum and 0.5% FBS with antibiotics) overnight.

The next morning, remove the medium and wash the cells with PBS. Scrape off the cells from the plate, suspend the cells well in 2 ml low serum medium. Count
5 the cell number and add more low serum medium to reach final cell density as 5×10^5 cells/ml.

Add 200 μ l of the cell suspension to each well of 96-well plate (equivalent to 1×10^5 cells/well). Add 50 μ l supernatant produced by Example 11, 37°C for 48 to 72 hr. As a positive control, a growth factor known to activate PC12 cells through EGR
10 can be used, such as 50 ng/ μ l of Neuronal Growth Factor (NGF). Over fifty-fold induction of SEAP is typically seen in the positive control wells. SEAP assay the supernatant according to Example 17.

Example 16: High-Throughput Screening Assay for T-cell Activity

15 NF- κ B (Nuclear Factor κ B) is a transcription factor activated by a wide variety of agents including the inflammatory cytokines IL-1 and TNF, CD30 and CD40, lymphotoxin-alpha and lymphotoxin-beta, by exposure to LPS or thrombin, and by expression of certain viral gene products. As a transcription factor, NF- κ B regulates the expression of genes involved in immune cell activation, control of
20 apoptosis (NF- κ B appears to shield cells from apoptosis), B and T-cell development, anti-viral and antimicrobial responses, and multiple stress responses.

In non-stimulated conditions, NF- κ B is retained in the cytoplasm with I- κ B (Inhibitor κ B). However, upon stimulation, I- κ B is phosphorylated and degraded, causing NF- κ B to shuttle to the nucleus, thereby activating transcription of target
25 genes. Target genes activated by NF- κ B include IL-2, IL-6, GM-CSF, ICAM-1 and class 1 MHC.

Due to its central role and ability to respond to a range of stimuli, reporter constructs utilizing the NF- κ B promoter element are used to screen the supernatants produced in Example 11. Activators or inhibitors of NF- κ B would be useful in
30 treating diseases. For example, inhibitors of NF- κ B could be used to treat those

diseases related to the acute or chronic activation of NF- κ B, such as rheumatoid arthritis.

To construct a vector containing the NF- κ B promoter element, a PCR based strategy is employed. The upstream primer contains four tandem copies of the NF- κ B binding site (GGGGACTTTCCC) (SEQ ID NO:8), 18 bp of sequence complementary to the 5' end of the SV40 early promoter sequence, and is flanked with an XhoI site:
5':GCGGCCTCGAGGGGACTTTCCCGGGGACTTTCCGGGGACTTTCCGGGAC
TTTCCATCCTGCCATCTCAATTAG:3' (SEQ ID NO:9)

The downstream primer is complementary to the 3' end of the SV40 promoter and is flanked with a Hind III site:
5':GCGGCAAGCTTTTTGCAAAGCCTAGGC:3' (SEQ ID NO:4)

PCR amplification is performed using the SV40 promoter template present in the pB-gal:promoter plasmid obtained from Clontech. The resulting PCR fragment is digested with XhoI and Hind III and subcloned into BLSK2-. (Stratagene)
Sequencing with the T7 and T3 primers confirms the insert contains the following sequence:

5':CTCGAGGGGACTTTCCCGGGGACTTTCCGGGGACTTTCCGGGACTTTCC
ATCTGCCATCTCAATTAGTCAGCAACCATAGTCCCGCCCCTAACTCCGCCC
ATCCCGCCCCTAACTCCGCCCAGTTCCGCCCATTCTCCGCCCCATGGCTGA
CTAATTTTTTTTATTTATGCAGAGGCCGAGGCCGCCTCGGCCTCTGAGCTA
TTCCAGAAGTAGTGAGGAGGCTTTTTTGGAGGCCTAGGCTTTTGCAAAAA
GCTT:3' (SEQ ID NO:10)

Next, replace the SV40 minimal promoter element present in the pSEAP2-promoter plasmid (Clontech) with this NF- κ B/SV40 fragment using XhoI and HindIII. However, this vector does not contain a neomycin resistance gene, and therefore, is not preferred for mammalian expression systems.

In order to generate stable mammalian cell lines, the NF- κ B/SV40/SEAP cassette is removed from the above NF- κ B/SEAP vector using restriction enzymes SalI and NotI, and inserted into a vector containing neomycin resistance. Particularly,

the NF- κ B/SV40/SEAP cassette was inserted into pGFP-1 (Clontech), replacing the GFP gene, after restricting pGFP-1 with SalI and NotI.

Once NF- κ B/SV40/SEAP/Neo vector is created, stable Jurkat T-cells are created and maintained according to the protocol described in Example 13. Similarly, the method for assaying supernatants with these stable Jurkat T-cells is also described in Example 13. As a positive control, exogenous TNF alpha (0.1, 1, 10 ng) is added to wells H9, H10, and H11, with a 5-10 fold activation typically observed.

Example 17: Assay for SEAP Activity

As a reporter molecule for the assays described in Examples 13-16, SEAP activity is assayed using the Tropix Phospho-light Kit (Cat. BP-400) according to the following general procedure. The Tropix Phospho-light Kit supplies the Dilution, Assay, and Reaction Buffers used below.

Prime a dispenser with the 2.5x Dilution Buffer and dispense 15 μ l of 2.5x dilution buffer into Optiplates containing 35 μ l of a supernatant. Seal the plates with a plastic sealer and incubate at 65°C for 30 min. Separate the Optiplates to avoid uneven heating.

Cool the samples to room temperature for 15 minutes. Empty the dispenser and prime with the Assay Buffer. Add 50 μ l Assay Buffer and incubate at room temperature 5 min. Empty the dispenser and prime with the Reaction Buffer (see the table below). Add 50 μ l Reaction Buffer and incubate at room temperature for 20 minutes. Since the intensity of the chemiluminescent signal is time dependent, and it takes about 10 minutes to read 5 plates on luminometer, one should treat 5 plates at each time and start the second set 10 minutes later.

Read the relative light unit in the luminometer. Set H12 as blank, and print the results. An increase in chemiluminescence indicates reporter activity.

Reaction Buffer Formulation:

# of plates	Rxn buffer diluent (ml)	CSPD (ml)
10	60	3
11	65	3.25
12	70	3.5
13	75	3.75
14	80	4
15	85	4.25

16	90	4.5
17	95	4.75
18	100	5
19	105	5.25
20	110	5.5
21	115	5.75
22	120	6
23	125	6.25
24	130	6.5
25	135	6.75
26	140	7
27	145	7.25
28	150	7.5
29	155	7.75
30	160	8
31	165	8.25
32	170	8.5
33	175	8.75
34	180	9
35	185	9.25
36	190	9.5
37	195	9.75
38	200	10
39	205	10.25
40	210	10.5
41	215	10.75
42	220	11
43	225	11.25
44	230	11.5
45	235	11.75
46	240	12
47	245	12.25
48	250	12.5
49	255	12.75
50	260	13

Example 18: High-Throughput Screening Assay Identifying Changes in Small Molecule Concentration and Membrane Permeability

Binding of a ligand to a receptor is known to alter intracellular levels of small molecules, such as calcium, potassium, sodium, and pH, as well as alter membrane potential. These alterations can be measured in an assay to identify supernatants which bind to receptors of a particular cell. Although the following protocol describes an assay for calcium, this protocol can easily be modified to detect changes in potassium, sodium, pH, membrane potential, or any other small molecule which is detectable by a fluorescent probe.

The following assay uses Fluorometric Imaging Plate Reader ("FLIPR") to measure changes in fluorescent molecules (Molecular Probes) that bind small

molecules. Clearly, any fluorescent molecule detecting a small molecule can be used instead of the calcium fluorescent molecule, fluo-4 (Molecular Probes, Inc.; catalog no. F-14202), used here.

For adherent cells, seed the cells at 10,000 -20,000 cells/well in a Co-star
5 black 96-well plate with clear bottom. The plate is incubated in a CO₂ incubator for 20 hours. The adherent cells are washed two times in Biotek washer with 200 ul of HBSS (Hank's Balanced Salt Solution) leaving 100 ul of buffer after the final wash.

A stock solution of 1 mg/ml fluo-4 is made in 10% pluronic acid DMSO. To
load the cells with fluo-4, 50 ul of 12 ug/ml fluo-4 is added to each well. The plate
10 is incubated at 37°C in a CO₂ incubator for 60 min. The plate is washed four times in the Biotek washer with HBSS leaving 100 ul of buffer.

For non-adherent cells, the cells are spun down from culture media. Cells are
re-suspended to 2-5x10⁶ cells/ml with HBSS in a 50-ml conical tube. 4 ul of 1 mg/ml
fluo-4 solution in 10% pluronic acid DMSO is added to each ml of cell suspension.
15 The tube is then placed in a 37°C water bath for 30-60 min. The cells are washed twice with HBSS, resuspended to 1x10⁶ cells/ml, and dispensed into a microplate, 100 ul/well. The plate is centrifuged at 1000 rpm for 5 min. The plate is then washed once in Denley CellWash with 200 ul, followed by an aspiration step to 100 ul final volume.

20 For a non-cell based assay, each well contains a fluorescent molecule, such as fluo-4. The supernatant is added to the well, and a change in fluorescence is detected.

To measure the fluorescence of intracellular calcium, the FLIPR is set for the
following parameters: (1) System gain is 300-800 mW; (2) Exposure time is 0.4
25 second; (3) Camera F/stop is F/2; (4) Excitation is 488 nm; (5) Emission is 530 nm; and (6) Sample addition is 50 ul. Increased emission at 530 nm indicates an extracellular signaling event which has resulted in an increase in the intracellular Ca⁺⁺ concentration.

30 **Example 19: High-Throughput Screening Assay Identifying Tyrosine Kinase Activity**

The Protein Tyrosine Kinases (PTK) represent a diverse group of transmembrane and cytoplasmic kinases. Within the Receptor Protein Tyrosine Kinase (RPTK) group are receptors for a range of mitogenic and metabolic growth factors including the PDGF, FGF, EGF, NGF, HGF and Insulin receptor subfamilies.

- 5 In addition there are a large family of RPTKs for which the corresponding ligand is unknown. Ligands for RPTKs include mainly secreted small proteins, but also membrane-bound and extracellular matrix proteins.

- Activation of RPTK by ligands involves ligand-mediated receptor dimerization, resulting in transphosphorylation of the receptor subunits and activation
10 of the cytoplasmic tyrosine kinases. The cytoplasmic tyrosine kinases include receptor associated tyrosine kinases of the src-family (e.g., src, yes, lck, lyn, fyn) and non-receptor linked and cytosolic protein tyrosine kinases, such as the Jak family, members of which mediate signal transduction triggered by the cytokine superfamily of receptors (e.g., the Interleukins, Interferons, GM-CSF, and Leptin).

- 15 Because of the wide range of known factors capable of stimulating tyrosine kinase activity, the identification of novel human secreted proteins capable of activating tyrosine kinase signal transduction pathways are of interest. Therefore, the following protocol is designed to identify those novel human secreted proteins capable of activating the tyrosine kinase signal transduction pathways.

- 20 Seed target cells (e.g., primary keratinocytes) at a density of approximately 25,000 cells per well in a 96 well Loprodyne Silent Screen Plates purchased from Nalge Nunc (Naperville, IL). The plates are sterilized with two 30 minute rinses with 100% ethanol, rinsed with water and dried overnight. Some plates are coated for 2 hr with 100 ml of cell culture grade type I collagen (50 mg/ml), gelatin (2%) or
25 polylysine (50 mg/ml), all of which can be purchased from Sigma Chemicals (St. Louis, MO) or 10% Matrigel purchased from Becton Dickinson (Bedford, MA), or calf serum, rinsed with PBS and stored at 4°C. Cell growth on these plates is assayed by seeding 5,000 cells/well in growth medium and indirect quantitation of cell number through use of alamarBlue as described by the manufacturer Alamar
30 Biosciences, Inc. (Sacramento, CA) after 48 hr. Falcon plate covers #3071 from Becton Dickinson (Bedford, MA) are used to cover the Loprodyne Silent Screen

Plates. Falcon Microtest III cell culture plates can also be used in some proliferation experiments.

To prepare extracts, A431 cells are seeded onto the nylon membranes of Loprodyne plates (20,000/200ml/well) and cultured overnight in complete medium.

- 5 Cells are quiesced by incubation in serum-free basal medium for 24 hr. After 5-20 minutes treatment with EGF (60ng/ml) or 50 ul of the supernatant produced in Example 11, the medium was removed and 100 ml of extraction buffer ((20 mM HEPES pH 7.5, 0.15 M NaCl, 1% Triton X-100, 0.1% SDS, 2 mM Na₃VO₄, 2 mM Na₄P₂O₇ and a cocktail of protease inhibitors (# 1836170) obtained from
- 10 Boehringer Mannheim (Indianapolis, IN) is added to each well and the plate is shaken on a rotating shaker for 5 minutes at 4°C. The plate is then placed in a vacuum transfer manifold and the extract filtered through the 0.45 mm membrane bottoms of each well using house vacuum. Extracts are collected in a 96-well catch/assay plate in the bottom of the vacuum manifold and immediately placed on
- 15 ice. To obtain extracts clarified by centrifugation, the content of each well, after detergent solubilization for 5 minutes, is removed and centrifuged for 15 minutes at 4°C at 16,000 x g.

- Test the filtered extracts for levels of tyrosine kinase activity. Although many methods of detecting tyrosine kinase activity are known, one method is described
- 20 here.

- Generally, the tyrosine kinase activity of a supernatant is evaluated by determining its ability to phosphorylate a tyrosine residue on a specific substrate (a biotinylated peptide). Biotinylated peptides that can be used for this purpose include PSK1 (corresponding to amino acids 6-20 of the cell division kinase cdc2-p34) and
- 25 PSK2 (corresponding to amino acids 1-17 of gastrin). Both peptides are substrates for a range of tyrosine kinases and are available from Boehringer Mannheim.

- The tyrosine kinase reaction is set up by adding the following components in order. First, add 10ul of 5uM Biotinylated Peptide, then 10ul ATP/Mg₂⁺ (5mM ATP/50mM MgCl₂), then 10ul of 5x Assay Buffer (40mM imidazole hydrochloride,
- 30 pH7.3, 40 mM beta-glycerophosphate, 1mM EGTA, 100mM MgCl₂, 5 mM MnCl₂, 0.5 mg/ml BSA), then 5ul of Sodium Vanadate(1mM), and then 5ul of water. Mix the

components gently and preincubate the reaction mix at 30°C for 2 min. Initial the reaction by adding 10ul of the control enzyme or the filtered supernatant.

The tyrosine kinase assay reaction is then terminated by adding 10 ul of 120mm EDTA and place the reactions on ice.

5 Tyrosine kinase activity is determined by transferring 50 ul aliquot of reaction mixture to a microtiter plate (MTP) module and incubating at 37°C for 20 min. This allows the streptavidin coated 96 well plate to associate with the biotinylated peptide. Wash the MTP module with 300ul/well of PBS four times. Next add 75 ul of anti-phosphotyrosine antibody conjugated to horse radish peroxidase(anti-P-Tyr-

10 POD(0.5u/ml)) to each well and incubate at 37°C for one hour. Wash the well as above.

Next add 100ul of peroxidase substrate solution (Boehringer Mannheim) and incubate at room temperature for at least 5 mins (up to 30 min). Measure the absorbance of the sample at 405 nm by using ELISA reader. The level of bound
15 peroxidase activity is quantitated using an ELISA reader and reflects the level of tyrosine kinase activity.

Example 20: High-Throughput Screening Assay Identifying Phosphorylation Activity

20 As a potential alternative and/or compliment to the assay of protein tyrosine kinase activity described in Example 19, an assay which detects activation (phosphorylation) of major intracellular signal transduction intermediates can also be used. For example, as described below one particular assay can detect tyrosine phosphorylation of the Erk-1 and Erk-2 kinases. However, phosphorylation of other
25 molecules, such as Raf, JNK, p38 MAP, Map kinase kinase (MEK), MEK kinase, Src, Muscle specific kinase (MuSK), IRAK, Tec, and Janus, as well as any other phosphoserine, phosphotyrosine, or phosphothreonine molecule, can be detected by substituting these molecules for Erk-1 or Erk-2 in the following assay.

Specifically, assay plates are made by coating the wells of a 96-well ELISA
30 plate with 0.1ml of protein G (1ug/ml) for 2 hr at room temp, (RT). The plates are then rinsed with PBS and blocked with 3% BSA/PBS for 1 hr at RT. The protein G

plates are then treated with 2 commercial monoclonal antibodies (100ng/well) against Erk-1 and Erk-2 (1 hr at RT) (Santa Cruz Biotechnology). (To detect other molecules, this step can easily be modified by substituting a monoclonal antibody detecting any of the above described molecules.) After 3-5 rinses with PBS, the plates are stored at 4°C until use.

A431 cells are seeded at 20,000/well in a 96-well Loprodyne filterplate and cultured overnight in growth medium. The cells are then starved for 48 hr in basal medium (DMEM) and then treated with EGF (6ng/well) or 50 ul of the supernatants obtained in Example 11 for 5-20 minutes. The cells are then solubilized and extracts filtered directly into the assay plate.

After incubation with the extract for 1 hr at RT, the wells are again rinsed. As a positive control, a commercial preparation of MAP kinase (10ng/well) is used in place of A431 extract. Plates are then treated with a commercial polyclonal (rabbit) antibody (1ug/ml) which specifically recognizes the phosphorylated epitope of the Erk-1 and Erk-2 kinases (1 hr at RT). This antibody is biotinylated by standard procedures. The bound polyclonal antibody is then quantitated by successive incubations with Europium-streptavidin and Europium fluorescence enhancing reagent in the Wallac DELFIA instrument (time-resolved fluorescence). An increased fluorescent signal over background indicates a phosphorylation.

Example 21: Method of Determining Alterations in a Gene Corresponding to a Polynucleotide

RNA isolated from entire families or individual patients presenting with a phenotype of interest (such as a disease) is be isolated. cDNA is then generated from these RNA samples using protocols known in the art. (See, Sambrook.) The cDNA is then used as a template for PCR, employing primers surrounding regions of interest in SEQ ID NO:X. Suggested PCR conditions consist of 35 cycles at 95°C for 30 seconds; 60-120 seconds at 52-58°C; and 60-120 seconds at 70°C, using buffer solutions described in Sidransky, D., et al., Science 252:706 (1991).

PCR products are then sequenced using primers labeled at their 5' end with T4 polynucleotide kinase, employing SequiTherm Polymerase. (Epicentre Technologies). The intron-exon borders of selected exons is also determined and genomic PCR products analyzed to confirm the results. PCR products harboring suspected mutations is then cloned and sequenced to validate the results of the direct sequencing.

PCR products is cloned into T-tailed vectors as described in Holton, T.A. and Graham, M.W., *Nucleic Acids Research*, 19:1156 (1991) and sequenced with T7 polymerase (United States Biochemical). Affected individuals are identified by mutations not present in unaffected individuals.

Genomic rearrangements are also observed as a method of determining alterations in a gene corresponding to a polynucleotide. Genomic clones isolated according to Example 2 are nick-translated with digoxigenindeoxy-uridine 5'-triphosphate (Boehringer Mannheim), and FISH performed as described in Johnson, Cg. et al., *Methods Cell Biol.* 35:73-99 (1991). Hybridization with the labeled probe is carried out using a vast excess of human cot-1 DNA for specific hybridization to the corresponding genomic locus.

Chromosomes are counterstained with 4,6-diamino-2-phenylidole and propidium iodide, producing a combination of C- and R-bands. Aligned images for precise mapping are obtained using a triple-band filter set (Chroma Technology, Brattleboro, VT) in combination with a cooled charge-coupled device camera (Photometrics, Tucson, AZ) and variable excitation wavelength filters. (Johnson, Cv. et al., *Genet. Anal. Tech. Appl.*, 8:75 (1991).) Image collection, analysis and chromosomal fractional length measurements are performed using the ISee Graphical Program System. (Inovision Corporation, Durham, NC.) Chromosome alterations of the genomic region hybridized by the probe are identified as insertions, deletions, and translocations. These alterations are used as a diagnostic marker for an associated disease.

Example 22: Method of Detecting Abnormal Levels of a Polypeptide in a Biological Sample

A polypeptide of the present invention can be detected in a biological sample, and if an increased or decreased level of the polypeptide is detected, this polypeptide is a marker for a particular phenotype. Methods of detection are numerous, and thus, it is understood that one skilled in the art can modify the following assay to fit their particular needs.

For example, antibody-sandwich ELISAs are used to detect polypeptides in a sample, preferably a biological sample. Wells of a microtiter plate are coated with specific antibodies, at a final concentration of 0.2 to 10 ug/ml. The antibodies are either monoclonal or polyclonal and are produced by the method described in Example 10. The wells are blocked so that non-specific binding of the polypeptide to the well is reduced.

The coated wells are then incubated for > 2 hours at RT with a sample containing the polypeptide. Preferably, serial dilutions of the sample should be used to validate results. The plates are then washed three times with deionized or distilled water to remove unbounded polypeptide.

Next, 50 ul of specific antibody-alkaline phosphatase conjugate, at a concentration of 25-400 ng, is added and incubated for 2 hours at room temperature. The plates are again washed three times with deionized or distilled water to remove unbounded conjugate.

Add 75 ul of 4-methylumbelliferyl phosphate (MUP) or p-nitrophenyl phosphate (NPP) substrate solution to each well and incubate 1 hour at room temperature. Measure the reaction by a microtiter plate reader. Prepare a standard curve, using serial dilutions of a control sample, and plot polypeptide concentration on the X-axis (log scale) and fluorescence or absorbance of the Y-axis (linear scale). Interpolate the concentration of the polypeptide in the sample using the standard curve.

Example 23: Formulating a Polypeptide

The secreted polypeptide composition will be formulated and dosed in a fashion consistent with good medical practice, taking into account the clinical condition of the individual patient (especially the side effects of treatment with the secreted polypeptide alone), the site of delivery, the method of administration, the

scheduling of administration, and other factors known to practitioners. The "effective amount" for purposes herein is thus determined by such considerations.

As a general proposition, the total pharmaceutically effective amount of secreted polypeptide administered parenterally per dose will be in the range of about 1
5 $\mu\text{g/kg/day}$ to 10 mg/kg/day of patient body weight, although, as noted above, this will be subject to therapeutic discretion. More preferably, this dose is at least 0.01 mg/kg/day , and most preferably for humans between about 0.01 and 1 mg/kg/day for the hormone. If given continuously, the secreted polypeptide is typically administered at a dose rate of about 1 $\mu\text{g/kg/hour}$ to about 50 $\mu\text{g/kg/hour}$, either by 1-
10 4 injections per day or by continuous subcutaneous infusions, for example, using a mini-pump. An intravenous bag solution may also be employed. The length of treatment needed to observe changes and the interval following treatment for responses to occur appears to vary depending on the desired effect.

Pharmaceutical compositions containing the secreted protein of the invention
15 are administered orally, rectally, parenterally, intracisternally, intravaginally, intraperitoneally, topically (as by powders, ointments, gels, drops or transdermal patch), buccally, or as an oral or nasal spray. "Pharmaceutically acceptable carrier" refers to a non-toxic solid, semisolid or liquid filler, diluent, encapsulating material or formulation auxiliary of any type. The term "parenteral" as used herein refers to
20 modes of administration which include intravenous, intramuscular, intraperitoneal, intrasternal, subcutaneous and intraarticular injection and infusion.

The secreted polypeptide is also suitably administered by sustained-release systems. Suitable examples of sustained-release compositions include semi-permeable polymer matrices in the form of shaped articles, e.g., films, or
25 microcapsules. Sustained-release matrices include polylactides (U.S. Pat. No. 3,773,919, EP 58,481), copolymers of L-glutamic acid and gamma-ethyl-L-glutamate (Sidman, U. et al., Biopolymers 22:547-556 (1983)), poly (2-hydroxyethyl methacrylate) (R. Langer et al., J. Biomed. Mater. Res. 15:167-277 (1981), and R. Langer, Chem. Tech. 12:98-105 (1982)), ethylene vinyl acetate (R. Langer et al.) or
30 poly-D- (-)-3-hydroxybutyric acid (EP 133,988). Sustained-release compositions also include liposomally entrapped polypeptides. Liposomes containing the secreted polypeptide are prepared by methods known per se: DE 3,218,121; Epstein et al.,

Proc. Natl. Acad. Sci. USA 82:3688-3692 (1985); Hwang et al., Proc. Natl. Acad. Sci. USA 77:4030-4034 (1980); EP 52,322; EP 36,676; EP 88,046; EP 143,949; EP 142,641; Japanese Pat. Appl. 83-118008; U.S. Pat. Nos. 4,485,045 and 4,544,545; and EP 102,324. Ordinarily, the liposomes are of the small (about 200-800 Angstroms)
5 unilamellar type in which the lipid content is greater than about 30 mol. percent cholesterol, the selected proportion being adjusted for the optimal secreted polypeptide therapy.

For parenteral administration, in one embodiment, the secreted polypeptide is formulated generally by mixing it at the desired degree of purity, in a unit dosage
10 injectable form (solution, suspension, or emulsion), with a pharmaceutically acceptable carrier, i.e., one that is non-toxic to recipients at the dosages and concentrations employed and is compatible with other ingredients of the formulation. For example, the formulation preferably does not include oxidizing agents and other compounds that are known to be deleterious to polypeptides.

15 Generally, the formulations are prepared by contacting the polypeptide uniformly and intimately with liquid carriers or finely divided solid carriers or both. Then, if necessary, the product is shaped into the desired formulation. Preferably the carrier is a parenteral carrier, more preferably a solution that is isotonic with the blood of the recipient. Examples of such carrier vehicles include water, saline, Ringer's
20 solution, and dextrose solution. Non-aqueous vehicles such as fixed oils and ethyl oleate are also useful herein, as well as liposomes.

The carrier suitably contains minor amounts of additives such as substances that enhance isotonicity and chemical stability. Such materials are non-toxic to recipients at the dosages and concentrations employed, and include buffers such as
25 phosphate, citrate, succinate, acetic acid, and other organic acids or their salts; antioxidants such as ascorbic acid; low molecular weight (less than about ten residues) polypeptides, e.g., polyarginine or tripeptides; proteins, such as serum albumin, gelatin, or immunoglobulins; hydrophilic polymers such as polyvinylpyrrolidone; amino acids, such as glycine, glutamic acid, aspartic acid, or
30 arginine; monosaccharides, disaccharides, and other carbohydrates including cellulose or its derivatives, glucose, manose, or dextrans; chelating agents such as EDTA; sugar

alcohols such as mannitol or sorbitol; counterions such as sodium; and/or nonionic surfactants such as polysorbates, poloxamers, or PEG.

The secreted polypeptide is typically formulated in such vehicles at a concentration of about 0.1 mg/ml to 100 mg/ml, preferably 1-10 mg/ml, at a pH of about 3 to 8. It will be understood that the use of certain of the foregoing excipients, carriers, or stabilizers will result in the formation of polypeptide salts.

Any polypeptide to be used for therapeutic administration can be sterile. Sterility is readily accomplished by filtration through sterile filtration membranes (e.g., 0.2 micron membranes). Therapeutic polypeptide compositions generally are placed into a container having a sterile access port, for example, an intravenous solution bag or vial having a stopper pierceable by a hypodermic injection needle.

Polypeptides ordinarily will be stored in unit or multi-dose containers, for example, sealed ampoules or vials, as an aqueous solution or as a lyophilized formulation for reconstitution. As an example of a lyophilized formulation, 10-ml vials are filled with 5 ml of sterile-filtered 1% (w/v) aqueous polypeptide solution, and the resulting mixture is lyophilized. The infusion solution is prepared by reconstituting the lyophilized polypeptide using bacteriostatic Water-for-Injection.

The invention also provides a pharmaceutical pack or kit comprising one or more containers filled with one or more of the ingredients of the pharmaceutical compositions of the invention. Associated with such container(s) can be a notice in the form prescribed by a governmental agency regulating the manufacture, use or sale of pharmaceuticals or biological products, which notice reflects approval by the agency of manufacture, use or sale for human administration. In addition, the polypeptides of the present invention may be employed in conjunction with other therapeutic compounds.

Example 24: Method of Treating Decreased Levels of the Polypeptide

It will be appreciated that conditions caused by a decrease in the standard or normal expression level of a secreted protein in an individual can be treated by administering the polypeptide of the present invention, preferably in the secreted form. Thus, the invention also provides a method of treatment of an individual in need of an increased level of the polypeptide comprising administering to such an

individual a pharmaceutical composition comprising an amount of the polypeptide to increase the activity level of the polypeptide in such an individual.

For example, a patient with decreased levels of a polypeptide receives a daily dose 0.1-100 ug/kg of the polypeptide for six consecutive days. Preferably, the polypeptide is in the secreted form. The exact details of the dosing scheme, based on administration and formulation, are provided in Example 23.

Example 25: Method of Treating Increased Levels of the Polypeptide

Antisense technology is used to inhibit production of a polypeptide of the present invention. This technology is one example of a method of decreasing levels of a polypeptide, preferably a secreted form, due to a variety of etiologies, such as cancer.

For example, a patient diagnosed with abnormally increased levels of a polypeptide is administered intravenously antisense polynucleotides at 0.5, 1.0, 1.5, 2.0 and 3.0 mg/kg day for 21 days. This treatment is repeated after a 7-day rest period if the treatment was well tolerated. The formulation of the antisense polynucleotide is provided in Example 23.

Example 26: Method of Treatment Using Gene Therapy

One method of gene therapy transplants fibroblasts, which are capable of expressing a polypeptide, onto a patient. Generally, fibroblasts are obtained from a subject by skin biopsy. The resulting tissue is placed in tissue-culture medium and separated into small pieces. Small chunks of the tissue are placed on a wet surface of a tissue culture flask, approximately ten pieces are placed in each flask. The flask is turned upside down, closed tight and left at room temperature over night. After 24 hours at room temperature, the flask is inverted and the chunks of tissue remain fixed to the bottom of the flask and fresh media (e.g., Ham's F12 media, with 10% FBS, penicillin and streptomycin) is added. The flasks are then incubated at 37°C for approximately one week.

At this time, fresh media is added and subsequently changed every several days. After an additional two weeks in culture, a monolayer of fibroblasts emerge. The monolayer is trypsinized and scaled into larger flasks.

pMV-7 (Kirschmeier, P.T. et al., DNA, 7:219-25 (1988)), flanked by the long terminal repeats of the Moloney murine sarcoma virus, is digested with EcoRI and HindIII and subsequently treated with calf intestinal phosphatase. The linear vector is fractionated on agarose gel and purified, using glass beads.

5 The cDNA encoding a polypeptide of the present invention can be amplified using PCR primers which correspond to the 5' and 3' end sequences respectively as set forth in Example 1. Preferably, the 5' primer contains an EcoRI site and the 3' primer includes a HindIII site. Equal quantities of the Moloney murine sarcoma virus linear backbone and the amplified EcoRI and HindIII fragment are added together, in the
10 presence of T4 DNA ligase. The resulting mixture is maintained under conditions appropriate for ligation of the two fragments. The ligation mixture is then used to transform bacteria HB101, which are then plated onto agar containing kanamycin for the purpose of confirming that the vector has the gene of interest properly inserted.

15 The amphotropic pA317 or GP+am12 packaging cells are grown in tissue culture to confluent density in Dulbecco's Modified Eagles Medium (DMEM) with 10% calf serum (CS), penicillin and streptomycin. The MSV vector containing the gene is then added to the media and the packaging cells transduced with the vector. The packaging cells now produce infectious viral particles containing the gene (the packaging cells are now referred to as producer cells).

20 Fresh media is added to the transduced producer cells, and subsequently, the media is harvested from a 10 cm plate of confluent producer cells. The spent media, containing the infectious viral particles, is filtered through a millipore filter to remove detached producer cells and this media is then used to infect fibroblast cells. Media is removed from a sub-confluent plate of fibroblasts and quickly replaced with the
25 media from the producer cells. This media is removed and replaced with fresh media. If the titer of virus is high, then virtually all fibroblasts will be infected and no selection is required. If the titer is very low, then it is necessary to use a retroviral vector that has a selectable marker, such as neo or his. Once the fibroblasts have been efficiently infected, the fibroblasts are analyzed to determine whether protein is
30 produced.

 The engineered fibroblasts are then transplanted onto the host, either alone or after having been grown to confluence on cytodex 3 microcarrier beads.

Example 27: Method of Treatment Using Gene Therapy - In Vivo

Another aspect of the present invention is using *in vivo* gene therapy methods to treat disorders, diseases and conditions. The gene therapy method relates to the introduction of naked nucleic acid (DNA, RNA, and antisense DNA or RNA) sequences into an animal to increase or decrease the expression of the polypeptide. The polynucleotide of the present invention may be operatively linked to a promoter or any other genetic elements necessary for the expression of the polypeptide by the target tissue. Such gene therapy and delivery techniques and methods are known in the art, see, for example, WO90/11092, WO98/11779; U.S. Patent NO. 5693622, 5705151, 5580859; Tabata H. et al. (1997) *Cardiovasc. Res.* 35(3):470-479, Chao J et al. (1997) *Pharmacol. Res.* 35(6):517-522, Wolff J.A. (1997) *Neuromuscul. Disord.* 7(5):314-318, Schwartz B. et al. (1996) *Gene Ther.* 3(5):405-411, Tsurumi Y. et al. (1996) *Circulation* 94(12):3281-3290 (incorporated herein by reference).

The polynucleotide constructs may be delivered by any method that delivers injectable materials to the cells of an animal, such as, injection into the interstitial space of tissues (heart, muscle, skin, lung, liver, intestine and the like). The polynucleotide constructs can be delivered in a pharmaceutically acceptable liquid or aqueous carrier.

The term "naked" polynucleotide, DNA or RNA, refers to sequences that are free from any delivery vehicle that acts to assist, promote, or facilitate entry into the cell, including viral sequences, viral particles, liposome formulations, lipofectin or precipitating agents and the like. However, the polynucleotides of the present invention may also be delivered in liposome formulations (such as those taught in Felgner P.L. et al. (1995) *Ann. NY Acad. Sci.* 772:126-139 and Abdallah B. et al. (1995) *Biol. Cell* 85(1):1-7) which can be prepared by methods well known to those skilled in the art.

The polynucleotide vector constructs used in the gene therapy method are preferably constructs that will not integrate into the host genome nor will they contain sequences that allow for replication. Any strong promoter known to those skilled in the art can be used for driving the expression of DNA. Unlike other gene therapies techniques, one major advantage of introducing naked nucleic acid sequences into

target cells is the transitory nature of the polynucleotide synthesis in the cells. Studies have shown that non-replicating DNA sequences can be introduced into cells to provide production of the desired polypeptide for periods of up to six months.

5 The polynucleotide construct can be delivered to the interstitial space of tissues within the an animal, including of muscle, skin, brain, lung, liver, spleen, bone marrow, thymus, heart, lymph, blood, bone, cartilage, pancreas, kidney, gall bladder, stomach, intestine, testis, ovary, uterus, rectum, nervous system, eye, gland, and connective tissue. Interstitial space of the tissues comprises the intercellular fluid, mucopolysaccharide matrix among the reticular fibers of organ tissues, elastic fibers
10 in the walls of vessels or chambers, collagen fibers of fibrous tissues, or that same matrix within connective tissue ensheathing muscle cells or in the lacunae of bone. It is similarly the space occupied by the plasma of the circulation and the lymph fluid of the lymphatic channels. Delivery to the interstitial space of muscle tissue is preferred for the reasons discussed below. They may be conveniently delivered by injection
15 into the tissues comprising these cells. They are preferably delivered to and expressed in persistent, non-dividing cells which are differentiated, although delivery and expression may be achieved in non-differentiated or less completely differentiated cells, such as, for example, stem cells of blood or skin fibroblasts. *In vivo* muscle cells are particularly competent in their ability to take up and express
20 polynucleotides.

For the naked polynucleotide injection, an effective dosage amount of DNA or RNA will be in the range of from about 0.05 g/kg body weight to about 50 mg/kg body weight. Preferably the dosage will be from about 0.005 mg/kg to about 20 mg/kg and more preferably from about 0.05 mg/kg to about 5 mg/kg. Of course, as
25 the artisan of ordinary skill will appreciate, this dosage will vary according to the tissue site of injection. The appropriate and effective dosage of nucleic acid sequence can readily be determined by those of ordinary skill in the art and may depend on the condition being treated and the route of administration. The preferred route of administration is by the parenteral route of injection into the interstitial space of
30 tissues. However, other parenteral routes may also be used, such as, inhalation of an aerosol formulation particularly for delivery to lungs or bronchial tissues, throat or mucous membranes of the nose. In addition, naked polynucleotide constructs can be

delivered to arteries during angioplasty by the catheter used in the procedure.

The dose response effects of injected polynucleotide in muscle *in vivo* is determined as follows. Suitable template DNA for production of mRNA coding for polypeptide of the present invention is prepared in accordance with a standard recombinant DNA methodology. The template DNA, which may be either circular or linear, is either used as naked DNA or complexed with liposomes. The quadriceps muscles of mice are then injected with various amounts of the template DNA.

Five to six week old female and male Balb/C mice are anesthetized by intraperitoneal injection with 0.3 ml of 2.5% Avertin. A 1.5 cm incision is made on the anterior thigh, and the quadriceps muscle is directly visualized. The template DNA is injected in 0.1 ml of carrier in a 1 cc syringe through a 27 gauge needle over one minute, approximately 0.5 cm from the distal insertion site of the muscle into the knee and about 0.2 cm deep. A suture is placed over the injection site for future localization, and the skin is closed with stainless steel clips.

After an appropriate incubation time (e.g., 7 days) muscle extracts are prepared by excising the entire quadriceps. Every fifth 15 um cross-section of the individual quadriceps muscles is histochemically stained for protein expression. A time course for protein expression may be done in a similar fashion except that quadriceps from different mice are harvested at different times. Persistence of DNA in muscle following injection may be determined by Southern blot analysis after preparing total cellular DNA and HIRT supernatants from injected and control mice. The results of the above experimentation in mice can be use to extrapolate proper dosages and other treatment parameters in humans and other animals using naked DNA.

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Example 28: Transgenic Animals.

The polypeptides of the invention can also be expressed in transgenic animals. Animals of any species, including, but not limited to, mice, rats, rabbits, hamsters, guinea pigs, pigs, micro-pigs, goats, sheep, cows and non-human primates, e.g., baboons, monkeys, and chimpanzees may be used to generate transgenic animals. In a specific embodiment, techniques described herein or otherwise known in the art, are

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used to express polypeptides of the invention in humans, as part of a gene therapy protocol.

Any technique known in the art may be used to introduce the transgene (i.e., polynucleotides of the invention) into animals to produce the founder lines of transgenic animals. Such techniques include, but are not limited to, pronuclear microinjection (Paterson et al., *Appl. Microbiol. Biotechnol.* 40:691-698 (1994); Carver et al., *Biotechnology (NY)* 11:1263-1270 (1993); Wright et al., *Biotechnology (NY)* 9:830-834 (1991); and Hoppe et al., U.S. Pat. No. 4,873,191 (1989)); retrovirus mediated gene transfer into germ lines (Van der Putten et al., *Proc. Natl. Acad. Sci., USA* 82:6148-6152 (1985)), blastocysts or embryos; gene targeting in embryonic stem cells (Thompson et al., *Cell* 56:313-321 (1989)); electroporation of cells or embryos (Lo, 1983, *Mol Cell. Biol.* 3:1803-1814 (1983)); introduction of the polynucleotides of the invention using a gene gun (see, e.g., Ulmer et al., *Science* 259:1745 (1993); introducing nucleic acid constructs into embryonic pleuripotent stem cells and transferring the stem cells back into the blastocyst; and sperm-mediated gene transfer (Lavitrano et al., *Cell* 57:717-723 (1989); etc. For a review of such techniques, see Gordon, "Transgenic Animals," *Intl. Rev. Cytol.* 115:171-229 (1989), which is incorporated by reference herein in its entirety.

Any technique known in the art may be used to produce transgenic clones containing polynucleotides of the invention, for example, nuclear transfer into enucleated oocytes of nuclei from cultured embryonic, fetal, or adult cells induced to quiescence (Campell et al., *Nature* 380:64-66 (1996); Wilmut et al., *Nature* 385:810-813 (1997)).

The present invention provides for transgenic animals that carry the transgene in all their cells, as well as animals which carry the transgene in some, but not all their cells, i.e., mosaic animals or chimeric. The transgene may be integrated as a single transgene or as multiple copies such as in concatamers, e.g., head-to-head tandems or head-to-tail tandems. The transgene may also be selectively introduced into and activated in a particular cell type by following, for example, the teaching of Lasko et al. (Lasko et al., *Proc. Natl. Acad. Sci. USA* 89:6232-6236 (1992)). The regulatory sequences required for such a cell-type specific activation will depend upon the particular cell type of interest, and will be apparent to those of skill in the art. When

it is desired that the polynucleotide transgene be integrated into the chromosomal site of the endogenous gene, gene targeting is preferred. Briefly, when such a technique is to be utilized, vectors containing some nucleotide sequences homologous to the endogenous gene are designed for the purpose of integrating, via homologous recombination with chromosomal sequences, into and disrupting the function of the nucleotide sequence of the endogenous gene. The transgene may also be selectively introduced into a particular cell type, thus inactivating the endogenous gene in only that cell type, by following, for example, the teaching of Gu et al. (Gu et al., Science 265:103-106 (1994)). The regulatory sequences required for such a cell-type specific inactivation will depend upon the particular cell type of interest, and will be apparent to those of skill in the art.

Once transgenic animals have been generated, the expression of the recombinant gene may be assayed utilizing standard techniques. Initial screening may be accomplished by Southern blot analysis or PCR techniques to analyze animal tissues to verify that integration of the transgene has taken place. The level of mRNA expression of the transgene in the tissues of the transgenic animals may also be assessed using techniques which include, but are not limited to, Northern blot analysis of tissue samples obtained from the animal, *in situ* hybridization analysis, and reverse transcriptase-PCR (rt-PCR). Samples of transgenic gene-expressing tissue may also be evaluated immunocytochemically or immunohistochemically using antibodies specific for the transgene product.

Once the founder animals are produced, they may be bred, inbred, outbred, or crossbred to produce colonies of the particular animal. Examples of such breeding strategies include, but are not limited to: outbreeding of founder animals with more than one integration site in order to establish separate lines; inbreeding of separate lines in order to produce compound transgenics that express the transgene at higher levels because of the effects of additive expression of each transgene; crossing of heterozygous transgenic animals to produce animals homozygous for a given integration site in order to both augment expression and eliminate the need for screening of animals by DNA analysis; crossing of separate homozygous lines to produce compound heterozygous or homozygous lines; and breeding to place the

transgene on a distinct background that is appropriate for an experimental model of interest.

Transgenic animals of the invention have uses which include, but are not limited to, animal model systems useful in elaborating the biological function of polypeptides of the present invention, studying conditions and/or disorders associated with aberrant expression, and in screening for compounds effective in ameliorating such conditions and/or disorders.

Example 29: Knock-Out Animals.

Endogenous gene expression can also be reduced by inactivating or "knocking out" the gene and/or its promoter using targeted homologous recombination. (*E.g.*, see Smithies et al., *Nature* 317:230-234 (1985); Thomas & Capecchi, *Cell* 51:503-512 (1987); Thompson et al., *Cell* 5:313-321 (1989); each of which is incorporated by reference herein in its entirety). For example, a mutant, non-functional polynucleotide of the invention (or a completely unrelated DNA sequence) flanked by DNA homologous to the endogenous polynucleotide sequence (either the coding regions or regulatory regions of the gene) can be used, with or without a selectable marker and/or a negative selectable marker, to transfect cells that express polypeptides of the invention *in vivo*. In another embodiment, techniques known in the art are used to generate knockouts in cells that contain, but do not express the gene of interest. Insertion of the DNA construct, via targeted homologous recombination, results in inactivation of the targeted gene. Such approaches are particularly suited in research and agricultural fields where modifications to embryonic stem cells can be used to generate animal offspring with an inactive targeted gene (*e.g.*, see Thomas & Capecchi 1987 and Thompson 1989, *supra*). However this approach can be routinely adapted for use in humans provided the recombinant DNA constructs are directly administered or targeted to the required site *in vivo* using appropriate viral vectors that will be apparent to those of skill in the art.

In further embodiments of the invention, cells that are genetically engineered to express the polypeptides of the invention, or alternatively, that are genetically engineered not to express the polypeptides of the invention (*e.g.*, knockouts) are administered to a patient *in vivo*. Such cells may be obtained from the patient (*i.e.*,

animal, including human) or an MHC compatible donor and can include, but are not limited to fibroblasts, bone marrow cells, blood cells (e.g., lymphocytes), adipocytes, muscle cells, endothelial cells etc. The cells are genetically engineered *in vitro* using recombinant DNA techniques to introduce the coding sequence of polypeptides of the invention into the cells, or alternatively, to disrupt the coding sequence and/or endogenous regulatory sequence associated with the polypeptides of the invention, e.g., by transduction (using viral vectors, and preferably vectors that integrate the transgene into the cell genome) or transfection procedures, including, but not limited to, the use of plasmids, cosmids, YACs, naked DNA, electroporation, liposomes, etc.

5 The coding sequence of the polypeptides of the invention can be placed under the control of a strong constitutive or inducible promoter or promoter/enhancer to achieve expression, and preferably secretion, of the polypeptides of the invention. The engineered cells which express and preferably secrete the polypeptides of the invention can be introduced into the patient systemically, e.g., in the circulation, or

10 intraperitoneally.

Alternatively, the cells can be incorporated into a matrix and implanted in the body, e.g., genetically engineered fibroblasts can be implanted as part of a skin graft; genetically engineered endothelial cells can be implanted as part of a lymphatic or vascular graft. (See, for example, Anderson et al. U.S. Patent No. 5,399,349; and

20 Mulligan & Wilson, U.S. Patent No. 5,460,959 each of which is incorporated by reference herein in its entirety).

When the cells to be administered are non-autologous or non-MHC compatible cells, they can be administered using well known techniques which prevent the development of a host immune response against the introduced cells. For

25 example, the cells may be introduced in an encapsulated form which, while allowing for an exchange of components with the immediate extracellular environment, does not allow the introduced cells to be recognized by the host immune system.

Transgenic and "knock-out" animals of the invention have uses which include, but are not limited to, animal model systems useful in elaborating the biological

30 function of polypeptides of the present invention, studying conditions and/or disorders associated with aberrant expression, and in screening for compounds effective in ameliorating such conditions and/or disorders.

It will be clear that the invention may be practiced otherwise than as particularly described in the foregoing description and examples. Numerous modifications and variations of the present invention are possible in light of the above teachings and, therefore, are within the scope of the appended claims.

5 The entire disclosure of each document cited (including patents, patent applications, journal articles, abstracts, laboratory manuals, books, or other disclosures) in the Background of the Invention, Detailed Description, and Examples is hereby incorporated herein by reference. Further, the hard copy of the sequence listing submitted herewith and the corresponding computer readable form are both
10 incorporated herein by reference in their entireties.

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13bis)

A. The indications made below relate to the microorganism referred to in the description on page <u>173</u> , line <u>N/A</u>	
B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet <input type="checkbox"/>	
Name of depositary institution <u>American Type Culture Collection</u>	
Address of depositary institution (including postal code and country) <u>10801 University Boulevard</u> <u>Manassas, Virginia 20110-2209</u> <u>United States of America</u>	
Date of deposit <u>April 7, 1998</u>	Accession Number <u>209745</u>
C. ADDITIONAL INDICATIONS (leave blank if not applicable) This information is continued on an additional sheet <input type="checkbox"/>	
D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE (if the indications are not for all designated States)	
EUROPE In respect to those designations in which a European Patent is sought a sample of the deposited microorganism will be made available until the publication of the mention of the grant of the European patent or until the date on which application has been refused or withdrawn or is deemed to be withdrawn, only by the issue of such a sample to an expert nominated by the person requesting the sample (Rule 28 (4) EPC).	
E. SEPARATE FURNISHING OF INDICATIONS (leave blank if not applicable)	
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CANADA

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NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

ATCC Deposit No. 208745

Page 3

DENMARK

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SWEDEN

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NETHERLANDS

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INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

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Address of depositary institution (including postal code and country) <u>10801 University Boulevard</u> <u>Manassas, Virginia 20110-2209</u> <u>United States of America</u>	
Date of deposit <u>April 7, 1998</u>	Accession Number <u>209746</u>
C. ADDITIONAL INDICATIONS (leave blank if not applicable) This information is continued on an additional sheet <input type="checkbox"/>	
D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE (if the indications are not for all designated States)	
EUROPE In respect to those designations in which a European Patent is sought a sample of the deposited microorganism will be made available until the publication of the mention of the grant of the European patent or until the date on which application has been refused or withdrawn or is deemed to be withdrawn, only by the issue of such a sample to an expert nominated by the person requesting the sample (Rule 28 (4) EPC).	
E. SEPARATE FURNISHING OF INDICATIONS (leave blank if not applicable)	
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ATCC Deposit No. 209746**Page 2****CANADA**

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NORWAY

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FINLAND

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UNITED KINGDOM

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ATCC Deposit No. 209746

Page 3

DENMARK

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SWEDEN

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NETHERLANDS

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Address of depositary institution <i>(including postal code and country)</i> <u>10801 University Boulevard</u> <u>Manassas, Virginia 20110-2209</u> <u>United States of America</u>	
Date of deposit <u>March 20, 1998</u>	Accession Number <u>209683</u>
C. ADDITIONAL INDICATIONS <i>(leave blank if not applicable)</i> This information is continued on an additional sheet <input type="checkbox"/>	
D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE <i>(if the indications are not for all designated States)</i>	
EUROPE In respect to those designations in which a European Patent is sought a sample of the deposited microorganism will be made available until the publication of the mention of the grant of the European patent or until the date on which application has been refused or withdrawn or is deemed to be withdrawn, only by the issue of such a sample to an expert nominated by the person requesting the sample (Rule 28 (4) EPC).	
E. SEPARATE FURNISHING OF INDICATIONS <i>(leave blank if not applicable)</i>	
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CANADA

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NORWAY

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AUSTRALIA

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FINLAND

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UNITED KINGDOM

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ATCC Deposit No. 209683

Page 3

DENMARK

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NETHERLANDS

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What Is Claimed Is:

1. An isolated nucleic acid molecule comprising a polynucleotide having a nucleotide sequence at least 95% identical to a sequence selected from the group consisting of:
 - (a) a polynucleotide fragment of SEQ ID NO:X or a polynucleotide fragment of the cDNA sequence included in ATCC Deposit No:Z, which is hybridizable to SEQ ID NO:X;
 - (b) a polynucleotide encoding a polypeptide fragment of SEQ ID NO:Y or a polypeptide fragment encoded by the cDNA sequence included in ATCC Deposit No:Z, which is hybridizable to SEQ ID NO:X;
 - (c) a polynucleotide encoding a polypeptide domain of SEQ ID NO:Y or a polypeptide domain encoded by the cDNA sequence included in ATCC Deposit No:Z, which is hybridizable to SEQ ID NO:X;
 - (d) a polynucleotide encoding a polypeptide epitope of SEQ ID NO:Y or a polypeptide epitope encoded by the cDNA sequence included in ATCC Deposit No:Z, which is hybridizable to SEQ ID NO:X;
 - (e) a polynucleotide encoding a polypeptide of SEQ ID NO:Y or the cDNA sequence included in ATCC Deposit No:Z, which is hybridizable to SEQ ID NO:X, having biological activity;
 - (f) a polynucleotide which is a variant of SEQ ID NO:X;
 - (g) a polynucleotide which is an allelic variant of SEQ ID NO:X;
 - (h) a polynucleotide which encodes a species homologue of the SEQ ID NO:Y;
 - (i) a polynucleotide capable of hybridizing under stringent conditions to any one of the polynucleotides specified in (a)-(h), wherein said polynucleotide does not hybridize under stringent conditions to a nucleic acid molecule having a nucleotide sequence of only A residues or of only T residues.

2. The isolated nucleic acid molecule of claim 1, wherein the polynucleotide fragment comprises a nucleotide sequence encoding a secreted protein.
- 5 3. The isolated nucleic acid molecule of claim 1, wherein the polynucleotide fragment comprises a nucleotide sequence encoding the sequence identified as SEQ ID NO:Y or the polypeptide encoded by the cDNA sequence included in ATCC Deposit No:Z, which is hybridizable to SEQ ID NO:X.
- 10 4. The isolated nucleic acid molecule of claim 1, wherein the polynucleotide fragment comprises the entire nucleotide sequence of SEQ ID NO:X or the cDNA sequence included in ATCC Deposit No:Z, which is hybridizable to SEQ ID NO:X.
- 15 5. The isolated nucleic acid molecule of claim 2, wherein the nucleotide sequence comprises sequential nucleotide deletions from either the C-terminus or the N-terminus.
- 20 6. The isolated nucleic acid molecule of claim 3, wherein the nucleotide sequence comprises sequential nucleotide deletions from either the C-terminus or the N-terminus.
- 25 7. A recombinant vector comprising the isolated nucleic acid molecule of claim 1.
8. A method of making a recombinant host cell comprising the isolated nucleic acid molecule of claim 1.
9. A recombinant host cell produced by the method of claim 8.
- 30 10. The recombinant host cell of claim 9 comprising vector sequences.

11. An isolated polypeptide comprising an amino acid sequence at least 95% identical to a sequence selected from the group consisting of:
- (a) a polypeptide fragment of SEQ ID NO:Y or the encoded sequence
5 included in ATCC Deposit No:Z;
 - (b) a polypeptide fragment of SEQ ID NO:Y or the encoded sequence included in ATCC Deposit No:Z, having biological activity;
 - (c) a polypeptide domain of SEQ ID NO:Y or the encoded sequence included in ATCC Deposit No:Z;
 - 10 (d) a polypeptide epitope of SEQ ID NO:Y or the encoded sequence included in ATCC Deposit No:Z;
 - (e) a secreted form of SEQ ID NO:Y or the encoded sequence included in ATCC Deposit No:Z;
 - (f) a full length protein of SEQ ID NO:Y or the encoded sequence included in
15 ATCC Deposit No:Z;
 - (g) a variant of SEQ ID NO:Y;
 - (h) an allelic variant of SEQ ID NO:Y; or
 - (i) a species homologue of the SEQ ID NO:Y.
12. The isolated polypeptide of claim 11, wherein the secreted form or the
20 full length protein comprises sequential amino acid deletions from either the C-terminus or the N-terminus.
13. An isolated antibody that binds specifically to the isolated polypeptide of claim 11.
25
14. A recombinant host cell that expresses the isolated polypeptide of claim 11.
15. A method of making an isolated polypeptide comprising:
- 30 (a) culturing the recombinant host cell of claim 14 under conditions such that said polypeptide is expressed; and

(b) recovering said polypeptide.

16. The polypeptide produced by claim 15.

5 17. A method for preventing, treating, or ameliorating a medical condition, comprising administering to a mammalian subject a therapeutically effective amount of the polypeptide of claim 11 or the polynucleotide of claim 1.

10 18. A method of diagnosing a pathological condition or a susceptibility to a pathological condition in a subject comprising:

(a) determining the presence or absence of a mutation in the polynucleotide of claim 1; and

(b) diagnosing a pathological condition or a susceptibility to a pathological condition based on the presence or absence of said mutation.

15

19. A method of diagnosing a pathological condition or a susceptibility to a pathological condition in a subject comprising:

(a) determining the presence or amount of expression of the polypeptide of claim 11 in a biological sample; and

20 (b) diagnosing a pathological condition or a susceptibility to a pathological condition based on the presence or amount of expression of the polypeptide.

20. A method for identifying a binding partner to the polypeptide of claim 11 comprising:

25 (a) contacting the polypeptide of claim 11 with a binding partner; and

(b) determining whether the binding partner effects an activity of the polypeptide.

21. The gene corresponding to the cDNA sequence of SEQ ID NO:Y.

30

22. A method of identifying an activity in a biological assay, wherein the method comprises:

- (a) expressing SEQ ID NO:X in a cell;
- (b) isolating the supernatant;
- 5 (c) detecting an activity in a biological assay; and
- (d) identifying the protein in the supernatant having the activity.

23. The product produced by the method of claim 20.

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 ctctatctcc agagccaaaa tcaagatttg ctatgttaga cgatgtaaaa attttagcca 180
 atggcctcct tcagttggga catggtctta aagactttgt ccataagacg aaggggccaaa 240
 ttaatgacat atttcaaaaa ctcaacatat ttgatcagtc tttttatgat ctatcgctgc 300
 aaaccagtga aatcaaagar gaagaaaaag aactgagaag aactacmtat aaactacaag 360
 tcaaaaaatga agaggtaaaag aatatgtcac ttgaactcaa ctcaaaactt gaaagcctcc 420
 tagnagaaaa aattctactt caacaaaaag tgaaatattt agaagagcaa ctaactaact 480
 taattcaaaa tcaacctgaa actccagaac acccagaagt aacttcactt aaaacttttg 540
 tagaaaaaca agataatagc atcaaagacy ttctccagac cgtggaagac caatatwaac 600
 aattaaacca acagcatagt caaataaaaag aratagaaaa tcagctcaga aggactagta 660
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 ccatttataa cagaggtgaa catacaagtg gcatgtatgc atncagaccc agcaactctc 840
 aagtttttca tgtctactgt gatgttatat caggtagtcc atggacatta attcaacatc 900
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 gcaaaaggac acttcaactg tccagagggt tattcaggag gctggtggtg gcatgatgag 1260
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 ggcaataatt taaacattaa cctcattcca agttaatgtg gtctaataat ctggtattaa 1500
 atccttaaga gaaagcttga gaaatagatt ttttttatct taaagtcact gtctatttaa 1560
 gattaaacat acaatcacat aaccttaaaa aaaaaaaa aaaaactcga ggggggcccg 1620
 gtaccaatcgcccg 1636

<210> 17
 <211> 1256
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (1240)
 <223> n equals a,t,g, or c

<400> 17
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 ccttaacttc ctccgcgggg ccagccacc ttccggagtc cgggttgccc acctgcaaac 180
 tctccgcctt ctgcacctgc caccctgag ccagcgcggg cgcccgagcg agtcatggcc 240
 aacgcggggc tgcagctgtt gggcttcatt ctgccttcc tgggatggat cggcgccatc 300
 gtcagcactg ccctgcccc gtaggagatt tactctatg ccggcgacaa catcgtgacc 360
 gccaggcca tgtaggagg gctgtggatg tcttgcgtgt cgagagcac cgggcagatc 420
 cagtgcagg tctttgactc cttgctgaat ctgagcagca cattgcaagc aaccctgccc 480

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ggcgcgatat	ttcttcttgc	aggctctggc	atttttagttg	ccacagcatg	gtatggcaat	660
agaatcggtc	aagaattcta	tgaccttatg	accccgagca	atgccaggta	cgaatttggt	720
caggctctct	tcactggcgt	ggctgctgct	tctctctgcc	ttctgggagg	tgccctactt	780
tgctgttcct	gtccccgaaa	aacaacctct	tacccaacac	caaggcccta	tccaaaacct	840
gcaccttcca	gcgggaaaga	ctacgtgtga	cacagaggca	aaaggagaaa	atcatgttga	900
aacaacccga	aaatggacat	tgagatacta	tcattaacat	taggacctta	gaattttggg	960
tattgtaatc	tgaagtatgg	tattacaata	caaacaataa	aacaaaaaac	ccatgtgtta	1020
aaatactcag	tgctaaacat	ggcttaatct	tattttatct	tctttcctca	atataggagg	1080
gaagattttt	ccattttgtat	tactgcttcc	cattgagtaa	tcatactcaa	ctgggggaag	1140
gggtgctcct	taaatatata	tagatatgta	tatatacatg	tttttctatt	aaaaatagac	1200
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<210> 18

<211> 1143

<212> DNA

<213> Homo sapiens

<220>

<221> SITE

<222> (1100)

<223> n equals a,t,g, or c

<400> 18

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acaacccggg	cgatggcacc	tttgtggacg	ctgcggccag	tgctgggtgtg	gacgaccccc	180
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tccgtttccg	gggacatcgc	cttcacccaa	gttctccatg	ccctccccctg	ttccgcacgg	360
tcatacccg	ccgactttga	caatgaccag	gagctggaga	atcttcttca	acaacattgc	420
ctaccgcagc	tcctcagcca	accgcctctt	ccgcgtcacc	cgtagagagc	acggagaccc	480
cctcatcgag	gagctcaatc	ccggcgacgc	cttggagcct	gagggccggg	gcacaggggg	540
tggtgtgacc	gacttcgacg	gagacgggat	gctggacctc	atcttgtccc	atggagagtc	600
catggctcaa	ccgctgtccg	tcttccgggg	caatcagggg	ttcaacaaca	actggctgcg	660
agtgtgtcca	cgcacccggg	ttggggcctt	tgccagggga	gctaagggtcg	tgctctacac	720
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aggattctcc	cagcaggaaa	atggccattg	catggacacc	aatgaatgca	tccagttccc	1020
attcgtgtgc	cctcgagaca	agccccgatg	tgtcaacacc	tatggaagct	acaggtgccc	1080
gaccaacaag	aagtgcagtn	cggggctacg	agtcccaacg	aggatggcac	atacgggctt	1140
gtc						1143

<210> 19

<211> 1537

<212> DNA

<213> Homo sapiens

<400> 19

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gaatcccctg	gaagcccaca	gagacagaga	cagcaagaga	agcagagata	aatacactca	180
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gttgttctcc	gccctctctg	tggaggtgat	ttggatcctg	gctgcagatg	gggttcaaca	360
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aaacaatgcc	cagtcgcccc	tcgatattca	gacagacagt	gtgacatttg	accctgattt	480
gcctgctctg	cagccccacg	gatatgacca	gcctggcacc	gagccttttg	acctgcacaa	540
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tgattcctat gacagcttga gtgaggctgc tgagaggcct cagggcctgg ctgtcctggg 780
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ctttaaaaaa aaaaaaaaaa aaaaaactcg agggggg 1537

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<210> 20
<211> 2672
<212> DNA
<213> Homo sapiens

<220>
<221> SITE
<222> (16)
<223> n equals a,t,g, or c

<220>
<221> SITE
<222> (28)
<223> n equals a,t,g, or c

<220>
<221> SITE
<222> (47)
<223> n equals a,t,g, or c

<220>
<221> SITE
<222> (52)
<223> n equals a,t,g, or c

<220>
<221> SITE
<222> (93)
<223> n equals a,t,g, or c

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gagccggggc cgcgcgcgcg ctgcccgcgc cgcgcsgcgg attytgcttc tcagaagatg 180
cactattata gatactctaa cgccaaggtc agctgctggt acaagtacct ccttttcagc 240
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tgggacctca acgtctactt caattgcagc ggtgccagct acagccgaga gaagtgcggg 720
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tatgatgtca ggattcagct gaagagcaag tgggatgagt ccatcttcac gaaaggctgc 840
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gccatctcgc	tgttgagat	atttggcatc	ttcctggcaa	ggacgctgat	ctcagacatc	960
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acgctgggag	gccagagcct	ttctctgcca	tcagccctac	gtccagaggg	agaggagccg	1080
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cagcctgaaa	ctgttggcca	gggtctctct	tgtggccatg	taccagggc	tggctggcct	2160
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<210> 21

<211> 1508

<212> DNA

<213> Homo sapiens

<400> 21

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<210> 22
 <211> 1447
 <212> DNA
 <213> Homo sapiens

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<210> 23
 <211> 1583
 <212> DNA
 <213> Homo sapiens

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<210> 24
 <211> 1669
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (587)
 <223> n equals a,t,g, or c

<220>
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 <222> (1634)
 <223> n equals a,t,g, or c

<220>
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 <222> (1648)
 <223> n equals a,t,g, or c

<220>
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 <222> (1659)
 <223> n equals a,t,g, or c

<220>
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 <222> (1668)
 <223> n equals a,t,g, or c

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1669

<210> 25
<211> 1053
<212> DNA
<213> Homo sapiens

<220>
<221> SITE
<222> (1025)
<223> n equals a,t,g, or c

<400> 25							
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<210> 26
<211> 1477
<212> DNA
<213> Homo sapiens

<220>
<221> SITE
<222> (7)
<223> n equals a,t,g, or c

<400> 26							
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ttataggttt	aataagtcta	ttgaggaaga	cctactcctg	tgtgaatctt	tgcaaagtaa		240
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<210> 27
 <211> 2504
 <212> DNA
 <213> Homo sapiens

<400> 27						
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<210> 28
 <211> 1866
 <212> DNA
 <213> Homo sapiens

<400> 28

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<210> 29
 <211> 1501
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (434)
 <223> n equals a,t,g, or c

<220>
 <221> SITE
 <222> (441)
 <223> n equals a,t,g, or c

<220>
 <221> SITE
 <222> (1300)
 <223> n equals a,t,g, or c

<400> 29						
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<210> 30
 <211> 1752
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (1099)
 <223> n equals a,t,g, or c

<400> 30						
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 <211> 2152

<212> DNA
<213> Homo sapiens

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<211> 1757
<212> DNA
<213> Homo sapiens

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<210> 33
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 <212> DNA
 <213> Homo sapiens

<400> 33						
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<210> 34
 <211> 526
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (283)
 <223> n equals a,t,g, or c

<400> 34						
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<210> 35
 <211> 2412
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (329)
 <223> n equals a,t,g, or c

<220>
 <221> SITE
 <222> (340)
 <223> n equals a,t,g, or c

<220>
 <221> SITE
 <222> (977)
 <223> n equals a,t,g, or c

<220>
 <221> SITE
 <222> (1117)
 <223> n equals a,t,g, or c

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<210> 36

<211> 1274

<212> DNA

<213> Homo sapiens

<400> 36

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<210> 37

<211> 1036

<212> DNA

<213> Homo sapiens

<220>

<221> SITE

<222> (43)

<223> n equals a,t,g, or c

<220>

<221> SITE

<222> (47)

<223> n equals a,t,g, or c

<220>

<221> SITE

<222> (58)

<223> n equals a,t,g, or c

<400> 37

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<210> 38
 <211> 1379
 <212> DNA
 <213> Homo sapiens

<400> 38						
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<210> 39
 <211> 1932
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (293)
 <223> n equals a.t.g. or c

<400> 39						
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ttataagcta	gg					1932

<210> 40

<211> 1430

<212> DNA

<213> Homo sapiens

<400> 40

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tgcaagtgc	cttakacaaa	tgagatcaga	tgacctgggg	aacgtggctt	gtacacacct	180
ttctgtgttc	tgtagcatca	gctaagacct	taaaatcagt	aagaaagtat	ctgtctctct	240
gttcacccat	aggaagcagc	ttcgtgtgta	gtgaaggagg	ctacctggac	atctccgact	300
ggttaaaccc	ggccaagctt	tcctgtatt	accagatcaa	tgccacctcc	ccatgggtga	360
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gtgagccatg	ggagccggga	tggggataga	aggtgggaga	ggctgggttg	aaagaggcat	480
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aggcccatca	atctaataaa	cactaatgta	tgtgtgccta	ttgcctttca	aggggggaaa	600
ttcttagaga	gccacagact	ctcagagtaa	gaaaggacca	cagagaacat	ctggcctagc	660
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<210> 41
 <211> 1407
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (353)
 <223> n equals a,t,g, or c

<400> 41
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 gacttaaaag accaaccatgc cagttgtgcc atcccttaag atgaaaagtt ccttttcttg 180
 tgttaatgta caaagctttt cttttggcac tgacaactgt gttctacctg ggaattttga 240
 atagccattt tcatggctgt gtgttgtgta acacaaatgt ttttaaatgg tattctcacc 300
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 ttttctgk gtttttcaact ccaccaaatac ttacaaatsr ttgaaagaaa tatattctaa 480
 cagtacgcac tgaatagtga aaataattag acattttaag aaccagagcc atagaattat 540
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 ctgaatttta tcatataasc aagtaataacc tatttagcat acctaaatct ttcagcactt 660
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 gtttttttag ttgtttaaat aagtaatat ttcaaaagaa taaaataacc aatgatattc 1320
 cttggaataa tctgtaaaac gtagttataa aattctattt tctacttaga aaaaaaaaaa 1380
 aaaaaaaaaa aaaaaaaaaa ggcggcc 1407

<210> 42
 <211> 950
 <212> DNA
 <213> Homo sapiens

<400> 42
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 tgccagattt gttaaatcag cgaccttatt ttatatatat ttctaagtca tggccatggg 180
 catagaagct tcttttttaa ttaagaagga aaaataaaaa tatgtgaaaa gaaagccata 240
 aaggctcatt tacacacatg taactccatg cacgaatgcc agtccttccc cttgtgtgtg 300
 cacttgagac tagttctact actatccttc aaaacccaag tgcattgaatt ccatgaagtt 360
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 cgaacaacaa caacaacaac aacaaaaata ccaaaaaaaa aaaaaaaaaa 950

<210> 43
 <211> 1004
 <212> DNA

<213> Homo sapiens

<400> 43

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aatgttataa	agacagttgt	ccagtttcat	gaatcttgta	ggtttttggt	tgtttatttg	180
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<210> 44

<211> 1681

<212> DNA

<213> Homo sapiens

<400> 44

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tgtagcatca	gggggatgga	ttttgtggcc	actgaggaga	ttgggtgggtg	cccatacagag	180
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agaaatagta	actctcctca	gtgttcccca	gctaagtaag	actatgcatt	taccatacac	1620
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a						1681

<210> 45

<211> 1365

<212> DNA

<213> Homo sapiens

<400> 45
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 aaaagtattt ggaaacttaa gatgaactac atttcttgca aagtacattc ctttctgttg 1260
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<210> 46
 <211> 1137
 <212> DNA
 <213> Homo sapiens

<400> 46
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 agacactttt gcccgaaaat ctctttcttc ctgacccctc ttcccagag tgcccgggat 120
 tccactgtca gaaatgcatt gtctgggtta aaaaacttaa cacctgctat gatttcaaca 180
 gtgtcaaaac aggatgcgtt aaaaactggc gaggaggaaa tgtatttggg ttctaggata 240
 gtgaaagctc tattttttct acttttctgt attttccata tttggtacaa tgagcacgta 300
 cttagaacgg ttttagattt acgaaaatat gcaaacacag tacagatagt tcttgcgtcc 360
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 ttctctctta catccttttc tgttccaaga tgcattccagg atgccgctt acattagtct 540
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<210> 47
 <211> 2763
 <212> DNA
 <213> Homo sapiens

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<210> 48
<211> 1576
<212> DNA
<213> Homo sapiens

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<220>
<221> SITE
<222> (252)
<223> n equals a,t,g, or c

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<220>
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<222> (804)
<223> n equals a,t,g, or c

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<210> 49

<211> 1348

<212> DNA

<213> Homo sapiens

<400> 49

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tcaatatgtt	tgaaaatttt	taaagttaga	ataaatagca	tctcattttg	taaaaaataa	360
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<210> 50

<211> 1264

<212> DNA

<213> Homo sapiens

<400> 50

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<210> 51
 <211> 1660
 <212> DNA
 <213> Homo sapiens

<400> 51						
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<210> 52
 <211> 1678
 <212> DNA
 <213> Homo sapiens

<400> 52

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<210> 53

<211> 1860

<212> DNA

<213> Homo sapiens

<220>

<221> SITE

<222> (912)

<223> n equals a,t,g, or c

<400> 53

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<210> 54
 <211> 1663
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (975)
 <223> n equals a,t,g, or c

<400> 54						
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<210> 55
 <211> 1632
 <212> DNA
 <213> Homo sapiens

<400> 55						
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<210> 56

<211> 2233

<212> DNA

<213> Homo sapiens

<400> 56

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<210> 57
 <211> 1963
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (1540)
 <223> n equals a,t,g, or c

<220>
 <221> SITE
 <222> (1935)
 <223> n equals a,t,g, or c

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<210> 58
 <211> 1267
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (1248)

<223> n equals a,t,g, or c

<220>

<221> SITE

<222> (1255)

<223> n equals a,t,g, or c

<400> 58

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<210> 59

<211> 1295

<212> DNA

<213> Homo sapiens

<400> 59

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<210> 60

<211> 915

<212> DNA

<213> Homo sapiens

<400> 60

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aaaaagggcg	gccgc					915

<210> 61

<211> 1445

<212> DNA

<213> Homo sapiens

<220>

<221> SITE

<222> (1047)

<223> n equals a,t,g, or c

<400> 61

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agtagtggtt	ttatttctgt	gcttctccct	cctaacagaa	tgtaaaacct	ttgaaccag	180
gtcagagagg	tcctttat	catatccct	gtgatgtcta	atttatgttg	atttacagat	240
aaatgatcgg	taaactttag	aaacagcact	ccagtttata	gctctgtgct	gtagacttac	300
tgaacaacta	cagtgaacc	aattcaaaaa	gggatatttt	gtattatgat	ttagtctcct	360
acttccaagg	ctagttttta	aggctgtgaa	gggaagctga	aaatgacaca	gtgtttctgg	420
gatgaccaga	cagacactgt	atccagagat	gctgtctgcg	cagcggggga	tagtaaaccc	480
cttagtacaa	cattaattgg	catggtgggt	tatgagttaa	tgtaatacca	aatattaaca	540
taaataaaaa	tatatttaag	tgataactaa	gctggacata	tatcttaaaa	gacaactaca	600
gcccagaaaa	caatgaacat	tgttgtccta	cagctatttt	gtcactgtga	tgatacctaa	660
ttttaatctt	aaaggagct	gatgtttata	acctagaagt	tgattttgat	aacatttgag	720
aaaacttcat	aaagctggca	caggtaacat	atttagtttt	gtatatctgc	tgccaatttt	780
gagtcctctaa	aaattatctt	agaatgaata	tgaaattcgc	aggatataag	accaagtttt	840
cagaaaataaa	aaatgtccaa	gtactttgaa	acatctat	ttcactcatt	attcagccta	900
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aatatatact	tcacacttca	cagttgtctc	tgtcagaaca	gactattgaa	aatgtaaacc	1140
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aggctgaggc	aggagaattg	cttgaaccca	ggaggcgagg	gttgcaatga	accaagatca	1380
caccactgca	ctccagccwa	ggtgatagag	tgacactctc	tcaaaaaaaaa	aaaaaaaaaa	1440
ctcga						1445

<210> 62

<211> 1100

<212> DNA

<213> Homo sapiens

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<400> 62
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tttttagtaac taccctttca tgtttcttta actcttgaaa tattttatta ggggttgagc     180
attcatgatg gtacctggaa gtcagcaatt tatgggtttg gagatcagag taatttgaga     240
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agggtggccaa ttctttattg tcgggaactc aaagggttatt ccattccttt tatgggatct     360
gatgtgtctg ttgtaaggag gactcaacgt tacttgtagt aaaatttaga ggaatcacca     420
gttcagtagt ctgcgtatgt aactgtggga ggcatcacct ctgttattaa gctgatgttt     480
gcaggacttt tctttttgtt ctttgtgagg tttggaattg gaaggcaact tctcataaaa     540
ttcccatggt tcttctcctt tggctatttt tcaaaacaag gcccaacaca aaaacagatt     600
gatgctgcct cattcacgct gacattcctt ggtaaggat acagccaagg cactggtaca     660
gataagaaca aaccaaatat caaaatttgt actcagggtga aaggaccaga ggctggctat     720
gtggctaccc ccatagctat gggtcaggga gccatgactc ttctaagtga tgcttctcat     780
ctgcctaagg cgggcggggg ctccacacct ggagcagctt ttcccaaac aaagttgatt     840
gacagactca acaaacacgg tatttgagtt agtggtatta gcagctctga agtctaaca     900
ctggaagaat taactgaagt cataacgtgc gtgaattaac agcttctcta ttgatattt     960
gaaattcttc tgtaagcctg tctgagtgtg tgtggaaacg attgtcaaat ctaaaaatc     1020
tatatatata aaagtaggaa attgtcctag cttaccctaa atttcaaaaa aaaaaaaa     1080
aaaaaaaaa gggcggcgcg

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<210> 63
<211> 1499
<212> DNA
<213> Homo sapiens

```

```

<220>
<221> SITE
<222> (52)
<223> n equals a,t,g, or c

```

```

<220>
<221> SITE
<222> (66)
<223> n equals a,t,g, or c

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<220>
<221> SITE
<222> (84)
<223> n equals a,t,g, or c

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<400> 63
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ctatcactgg agtcaggggt gaggggagga ccgcatgaca gttggttaat atacacttat     180
tttttggcaa aaacgttttc tctgggacca gaatgatctt gatactgaaa aaatttctag     240
tgctagatcc tctttctaag tgtgaaagga cttatctgga atgctccaga atgatcccaa     300
gtgttgagct gagagggacc tggcagcaga atctgattat tgaaaagtgg caattgttga     360
tttattgaag acagaataat aactcagcag aactgttatg ttgagctgaa cccgacctcc     420
ttcagccgaa tcatgcaaga atgcctgctg catggctgtt gctgctactt attaaaggct     480
ggtgttctgg gcacagtgca atgcatttct acatgggtga tccctcacgc aaatgaacaa     540
cacaggctta aggaaacaag caactctcaa agtcctgcag tgagtagagc ttagctgttg     600
gtagtcaaca tgccacgcga ttcggragtt gagcctgtct ccagagggtta gagatgttca     660
gtttcctctt aagggttctta cgtagatttt tttcatgact ttatctacat cctccttaaa     720
tttacgtttt tagtccttac tggctcttga tatcaccagt tttgttggtta ttagtaattt     780
ctaactgccc taaatttgtc tgttttaaga ttcaagggat gatacctcag tctgttatct     840
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cctcctaaca tttttatttg tcttcagac tcctaattta tttaatttat cgttaggaag     960
acgacttttc tgtcttttga tgatttttagc tgcccttctc tagacctgct tgattccatt     1020
atctttacca agaattgaaa gtgaaagtgg catttgtcat agaatgccat ggtcttattc     1080
caaagtatct taggatggaa caatacaagg cataatatgg ggtcagtgag gtttgttaca     1140
cgagtgaatg accaacaaca ctactgtctg ttcaaaccga gtctgaaggg tgaatcagac     1200

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cgaccattgg	ccgtgagggt	ctggactgct	cagtattatc	tcaaggatat	caagggttat	1260
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gaagggttgag	aatagttcag	agaccagagt	ctaagaccaa	tcaagaagaa	tggatcaatt	1380
agagatatga	attctggtgc	ttatatTTTT	gtggagctgg	ttgtgagata	aaaggTcaag	1440
cctaccagac	tgaaaagtgt	atgtgaaagc	tctttaaaaa	aaaaaaaaaa	aaactcgag	1499

<210> 64
 <211> 655
 <212> DNA
 <213> Homo sapiens

<400> 64						
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gtggttgccc	atgttaagaa	gagaaacacg	ctgaaTgtg	gccaggatgc	ctctgagaga	180
gaagagggac	agatccagat	tatggagcct	gtccaggTca	ctgtaggTga	ctcggtaata	240
atatTTccac	cccctccacc	accttacttt	cctgaatctt	cagcttctgc	ggTcgctgag	300
agtctggaa	ctaacagtct	gcttccgaat	gaaaacccc	cttcatatta	cagtattttc	360
aactatggga	ccccaaCTtc	agagggTgca	gcctctgaaa	gagactgtga	atctatatat	420
accatttctg	ggacgaattc	atcttctgag	gcctcacaca	ctccacatct	tccatctgaa	480
ttgcctccta	gatatgaaga	aaaagaaaat	gctgcagcta	cattcttgcc	tctatcttct	540
gagccttccc	caccgtaaac	tatggactct	agttcagttt	tatatgcaat	ggatcactac	600
tccatcaatt	tcttcaaaca	aaaaaacaaC	agcaaaaaaa	aaaaaaaaaa	aaaaa	655

<210> 65
 <211> 1446
 <212> DNA
 <213> Homo sapiens

<400> 65						
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cccctcagcc	ctgtggctgg	ggcagagctc	agactgtctt	ctgaagattg	atgtctattt	180
ccttgagctc	tttaattttg	ttgccaattt	ggataaaacat	ggcacaaatc	cagcagggag	240
gtccagatga	aaaagaaaag	actaccgcac	tgaagatttt	attatctagg	atagatttgg	300
atgaactaat	gaaaaaagat	gaaccgcctc	ttgatttctt	gataccctgg	aaggTttgaa	360
tatgctttta	atgaaaaggg	acagttaaga	cacataaaaa	ctgggggaacc	atttgttttt	420
aactaccggg	aagattttaca	cagatggaac	cagaaaagat	acgaggctct	aggagagatc	480
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cagtagatgc	cactgagagt	gaaccaaaaga	gttttatctt	tatgagtgag	gatgctttga	600
caaatccaca	gaagctgatg	gttttaattc	atggttagtgg	tgTgtcagg	gcagggcagt	660
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aagtagaaaa	gccgaagata	cacgtacagt	catcatctga	tagttcagat	gaaccagcag	840
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agaatgtgtt	tttcgttgct	cacagctatg	gaggacttgc	ttttgttgaa	ctgcaactca	1080
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taggactgaa	cgacaacccc	aaatgcaagt	gaccatgagc	aactacaaat	aggtatacat	1260
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ccccttaaat	ttatacataa	tcagcttctt	gtatggaccc	aaattggaga	aatgtaattc	1380
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aaaaaa						1446

<210> 66
 <211> 670
 <212> DNA
 <213> Homo sapiens

<400> 66
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ttttgcacaa atgactcttt tatatttaaat tgcatttcat tgcctccctt cttaaagcca 120
acaggctcag tttacaaacc tgtgagctac tgttggtgc tgcctccctt cccagtgaag 180
ggtacaaagc aataagcatc atgcatcctc cccttaccct tccaacacct ctctgcctct 240
ggctcagggt gctcaaagca cagatcctct cttaccctcg cccaggttt gaaacacata 300
gcctcatttc aaggtgtagc caggttcccc cgactttcct ctgggatata aaaaaggggg 360
taagggggca aagagagccc tctgggcctc tcctcccata cactactacac tgcccttct 420
cccccatca aaacgctcag agacgttgtg atgatgagc tgaggattat gcaacgttgt 480
ccaaccggag cggccagcat gaccagctgt ccaggggctg cctcctgcct tttcttttgt 540
aaagacaaga ccttggggag ttttaattct gttttgtact tgccctgtgg ggcctccact 600
gcttttctat gggagacact cttaatttaa cagatgagaa tattttgaaa aaaaaaaaaa 660
aaaaaaaaa 670

<210> 67
<211> 1692
<212> DNA
<213> Homo sapiens

<400> 67
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acagcctggg cgacagagag agactctccc aaacaaacaa aacaaaccc aaaaataaag 120
aagtcactct gaaagaagtt tcaacatttg ccttttcatt ctgagattac agtttcttat 180
aaacatctaa gagtgaagag tctgacgttt tttggtcaca gctgagccac tgcgtgaccc 240
ccgccccgcc ccacactcac tttgtcttag gcaaaagctgt actctgaaag ctggccccc 300
tggggaggtt agactgtgc ctgctcagaa gtctgtgggt gcctcagaga agggcaacaa 360
ccctaggctg gaccctagcc ttgagagtac ttctactgc cagagccsc agatycttc 420
cgggtggcag agatactgcc agaagagcct gcggtgcaca caccagaatc cgggtacttg 480
gatgagaagg acacattact gatcaccttc ctccaggcaa cctgtcagt taaggactac 540
agtcccgccc ccattatgta gatagggaag cagaggcaaa gaagttagga aactcgccca 600
gaactctcag ctcatgaata aaaaagcaga actaaaccc agtgctctcc ctggctgggc 660
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cagcgtgggt agcactgttc gcctcaaggg cagctgtgag gattacttgg gattgtcctg 780
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aatttgttt taatgcttat tggtaactct gcattagaag taactacaaa tgtcttatta 1620
aagtttccac tttaaatgca aaaaaaaaaa aaaaaaatga ccctcgaggg ggggcccggt 1680
acccaattcg cc 1692

<210> 68
<211> 655
<212> DNA
<213> Homo sapiens

<400> 68
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tatgctaagc agtcttcttt ttgatattta ataccatgg acataaactt ctgccttaga 180
ggtcgccatg gagttttgtt ttgttttgtt ttgttttgtt ttggccatct gttaacagtc 240
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tcaaaacttg cattkgctc tttttgttc agtgttgtgt gcatccacat tttyctttctt 360

ttttaaacaa	ccctgcttat	gtaacatcca	cattttctga	cttacctttc	aaacctgcc	420
gaaagcagaa	gtgatattta	awacacttgg	tatgttttat	atatwgattc	taatgataat	480
gtttrgtcta	agatggacct	gacaaggcca	ggcatrgtgg	ttcaacagca	ctttgagagg	540
ctgaggcgagg	atgattgcct	gagcctggga	gttcaagggt	acagtgaact	gtgatcacat	600
cctgccttct	agcctgggtg	acagagcaag	accctgtctc	aaaaaaaaa	aaaaa	655

<210> 69
 <211> 1618
 <212> DNA
 <213> Homo sapiens

<400> 69						
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tgaagttaagc	tagagaaaat	gttaacaaaa	ttataaagaa	taaaacacat	attttatata	1200
cttttttaga	gagagagttc	tcactatctt	tgcaaggctg	gactcgaatt	tctgggctca	1260
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<210> 70
 <211> 1802
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (1790)
 <223> n equals a,t,g, or c

<220>
 <221> SITE
 <222> (1792)
 <223> n equals a,t,g, or c

<220>
 <221> SITE
 <222> (1801)
 <223> n equals a,t,g, or c

<400> 70						
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acagaaaatac	aactaaaccc	tctgtcaacg	tgggtatgta	tttttttact	ttctatTTTT	180
caattagtTtc	ttttatgttt	tttcttctag	tcattgttaa	agctaccaat	ggaccaagat	240
atgttTgtggg	ttgtcgtcga	caggtaatac	tttatatttg	tatagtgcct	gatgattgac	300
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gcccataact	cacaaggatg	atttgttcag	acatagctag	ttattaacaa	agcctgaatt	420
caamccatgg	gctttgactc	ctggcattcc	gtacttttcta	ctgtattaca	ttgtctcagt	480
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tgaccaacat	ggtgaaaccc	cgtctttact	aaaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	1740
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<210> 71

<211> 1292

<212> DNA

<213> Homo sapiens

<400> 71

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ctttcttttg	agttttttgc	tcttgttgtt	aagcttttgg	agtttTgtggg	tttatacttt	180
tcatacagatt	tggaacatct	ttggctatta	tttctccaaa	tagtcacaca	tcgctcctcg	240
gattccagtt	acataTatat	tattaggTtc	ttgaagtTgt	cccatacctt	actgatgctc	300
tgctcttttt	ctttggTctt	atattttggg	ttcattttgga	tagtttttat	ttctgtgtct	360
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tttcatttat	atatctataa	tttTgtggTt	gatagaaatg	cagtTgatgta	gcaggTatca	480
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aaaaggTatg	caaaccaccc	tgTatgtcat	attaacattt	atgtcccttt	gtttccatgt	600
caacttttag	tttctctgcc	aaaacctaca	tatgtttttt	ttatagtatt	attctacatt	660
ttctgctgag	agtggacatc	tgcatTtagta	gttctatgat	atttTgttta	taagtTgcca	720
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tgcaTgagc	caagattTga	ccattTgcact	ccagcctggg	caacaagagc	aaaactctgt	1260
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<210> 72

<211> 1054

<212> DNA

<213> Homo sapiens

<400> 72

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<210> 73

<211> 733

<212> DNA

<213> Homo sapiens

<400> 73

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aggtgccctc	tgcaaatgag	ttctgacggc	cactgtcctc	aacgtctatg	ccagcatctt	180
cctcatcaca	gcgctgagcg	ttgctcgcta	ctgggtgggtg	gccatggctg	cggggccagg	240
cacccacctc	tcactcttct	gggcccgaat	agccacctg	gcagtgtggg	cgggcggtgc	300
cctggtgacg	gtgcccacag	ctgtcttcgg	ggtggarggt	gargtgtgtg	gtgtgcgcct	360
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cctggtgaag	tttgacctgg	tgccctggaa	cagtactttc	tatactatcc	agacgtatgt	660
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<210> 74

<211> 785

<212> DNA

<213> Homo sapiens

<220>

<221> SITE

<222> (716)

<223> n equals a,t,g, or c

<220>

<221> SITE

<222> (731)

<223> n equals a,t,g, or c

<220>

<221> SITE

<222> (772)

<223> n equals a,t,g, or c

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aatgttgat aatgttcagg tcacttatat ccttaatggt tttctccctg attcttttat      180
taactactga gagaagaata ttggcatgtc cacctataat tttgaattcg tctatttttc      240
tttcagatct gtctgttttg ccttaaacat tccttatctt tcagaataat taaaagtaaa      300
aaaacattgt tacttgtttt ttccatttct gatgttctcc attttggtgc atagatccaa      360
gtttctgagc ttttaccctg tgaatcatag tcattttaaa tttcttgta tatgtgagag      420
tttagttctg attactgctt tgtcttttca gattgtgttt tattgtgtat tttcacattc      480
cttgtaattt tttatgttaa aaaaattgtg tatgtgcmay gctgaacata ggacagaaga      540
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<210> 75
<211> 2341
<212> DNA
<213> Homo sapiens

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<220>
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<222> (161)
<223> n equals a,t,g, or c

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<220>
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<222> (163)
<223> n equals a,t,g, or c

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<220>
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<222> (170)
<223> n equals a,t,g, or c

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<220>
<221> SITE
<222> (1229)
<223> n equals a,t,g, or c

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<220>
<221> SITE
<222> (2243)
<223> n equals a,t,g, or c

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<220>
<221> SITE
<222> (2309)
<223> n equals a,t,g, or c

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tctactaaga aaaactataa accctgaaca ttatatataa nanatatgan aactcagacc      180
tgagagagacc aaggcagatg tggtagggac ttmataaatt gtatagtgtat gaatcctcta      240
agttttcttt tctgctttat aatttgcaga cttttagctg aaaatgccat caacatagaa      300
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aggaaaatagt ctaccaaggc agaaaacatt tcgacaataa ccactctact gtagtcaagt      420
accacagaaa acactattac ctcaagtga gagcttagat ctttagayct tcataccagc      480
caggctgtga caaggtgtcc caaccctcct ccagaatagt atctcagaat agcagaagtt      540
ggaactttca tcccacactt gtggtaataa gccctcact ctccctccac accttgatat      600

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gactggagag	caaatgggga	gctggatcta	ctctaaaagc	agcaatgaag	aagcaccctc	660
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<210> 76
 <211> 1882
 <212> DNA
 <213> Homo sapiens

 <220>
 <221> SITE
 <222> (755)
 <223> n equals a,t,g, or c

 <220>
 <221> SITE
 <222> (1237)
 <223> n equals a,t,g, or c

 <220>
 <221> SITE
 <222> (1866)
 <223> n equals a,t,g, or c

<400> 76						
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aaaaaaaaaa	aagggcgccc	gc				1882

<210> 77

<211> 2892

<212> DNA

<213> Homo sapiens

<220>

<221> SITE

<222> (858)

<223> n equals a,t,g, or c

<400> 77

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<210> 78
 <211> 1673
 <212> DNA
 <213> Homo sapiens

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<210> 79
 <211> 1461
 <212> DNA
 <213> Homo sapiens

<400> 79						
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<210> 80

<211> 1517

<212> DNA

<213> Homo sapiens

<220>

<221> SITE

<222> (1145)

<223> n equals a,t,g, or c

<400> 80

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tggtggacaa	ctaactctgag	atagtggtat	ctctggaaaag	cagtttagca	ctgggtgagtt	180
tggactttca	tggcaggctg	ccttggttca	tatcttttgg	taatgatact	tatcctctgt	240
raggcccatt	tctttatttg	tggaaatgaa	gacaaatagag	tgcttagata	taatttagaa	300
caatgtccgt	cacatagtaa	acacgtaata	aacggtagct	cttattgtta	ttattattac	360
tattattacc	ttgaagacag	gggctctgtc	ttgttcatca	ttccatctcc	agctcttagc	420
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tggccctgtc	caagcattgt	tagaggtaaa	tgggacaggg	cagtgaacaa	aacagacaaa	540
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aaaaaaaaaa	ctcgtag					1517

<210> 81
 <211> 574
 <212> DNA
 <213> Homo sapiens

<400> 81
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 gtctctctggc catgtgcgca ggggcagaag tgggtgcacag gtactaccga ccggacctga 180
 caatacctga aattccacca aagcgtggag aactcaaaac ggagcttttg ggactgaaag 240
 aaagaaaaca caaacctcaa gtttctcaac aggaggaact taaataacta tgccaagaat 300
 tctgtgaaca atataagtct taaatatgta tttcttaatt tattgcatca aactacttgt 360
 ccttaagcac ttagtcta at gctaactgca agaggagggtg ctacagtggat gtttagccga 420
 tacgttgaaa ttttaattacg gtttgattga tatttcttga aaactgccaa agcacatatc 480
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 gaatatttgt aagtctacta taaaaaaaaa aaaa 574

<210> 82
 <211> 1455
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (390)
 <223> n equals a,t,g, or c

<220>
 <221> SITE
 <222> (456)
 <223> n equals a,t,g, or c

<220>
 <221> SITE
 <222> (1100)
 <223> n equals a,t,g, or c

<220>
 <221> SITE
 <222> (1293)
 <223> n equals a,t,g, or c

<220>
 <221> SITE
 <222> (1409)
 <223> n equals a,t,g, or c

<400> 82
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 ggctctgggt ggatggcctg ggatccctgg aatcaggcct ctggaaggta tgcaaggatc 180
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 aacctctctc gtcttgaag atgaatgtwc ttgtctctgt tcactatgca gatgaggact 840

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<210> 83

<211> 1640

<212> DNA

<213> Homo sapiens

<220>

<221> SITE

<222> (687)

<223> n equals a,t,g, or c

<220>

<221> SITE

<222> (764)

<223> n equals a,t,g, or c

<400> 83

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<210> 84

<211> 525

<212> DNA

<213> Homo sapiens

<400> 84
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 ctgaagtgtc gctgacatgc aactgcctta actttgccta cctggcctcc ttatgatccc 180
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<210> 85
 <211> 837
 <212> DNA
 <213> Homo sapiens
 <220>
 <221> SITE
 <222> (717)
 <223> n equals a,t,g, or c

<400> 85
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 gtgagcgctc atgggatctg gttgtttaga agcatgcagc acctcctgct tcaactctctc 180
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 ggctggggcrc agtggctyry gcctgtralc ccagcaggag ttcgagacca ggcaggagaa 780
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<210> 86
 <211> 1574
 <212> DNA
 <213> Homo sapiens
 <220>
 <221> SITE
 <222> (19)
 <223> n equals a,t,g, or c

<220>
 <221> SITE
 <222> (873)
 <223> n equals a,t,g, or c

<400> 86
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 <212> DNA
 <213> Homo sapiens

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<210> 89

<211> 1864

<212> DNA

<213> Homo sapiens

<220>

<221> SITE

<222> (1844)

<223> n equals a,t,g, or c

<400> 89

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 <211> 1983
 <212> DNA
 <213> Homo sapiens

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 <211> 1957
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (349)
 <223> n equals a,t,g, or c

<400> 91

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<210> 92
 <211> 573
 <212> DNA
 <213> Homo sapiens

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<210> 93
 <211> 1212
 <212> DNA
 <213> Homo sapiens

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 <222> (849)
 <223> n equals a,t,g, or c

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 <222> (1087)
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<210> 95
 <211> 1274
 <212> DNA

<213> Homo sapiens

<220>

<221> SITE

<222> (722)

<223> n equals a,t,g, or c

<400> 95

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<210> 96

<211> 1780

<212> DNA

<213> Homo sapiens

<400> 96

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<210> 97
 <211> 2065
 <212> DNA
 <213> Homo sapiens

<400> 97

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<210> 98
 <211> 1154
 <212> DNA
 <213> Homo sapiens

<400> 98

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 <211> 615
 <212> DNA
 <213> Homo sapiens

<400> 99						
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<210> 100
 <211> 1624
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (117)
 <223> n equals a,t,g, or c

<400> 100						
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 <211> 1756
 <212> DNA
 <213> Homo sapiens

<400> 101						
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 <212> DNA
 <213> Homo sapiens

<400> 102						
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gtttttctta	actttgtgca	tatagcgtgg	gacctgccca	gaacagggtac	tcaacaattt	600
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cccaaataca	aacaaattcc	attttaaatg	gaatatatac	acttttagccc	ccaaatgcag	720
accagtgcac	gtctgtgtag	tttccgacta	gtcacctggt	aatagatcat	tcctgtcatt	780
cacaggctca	gtcccagctc	tatttttcag	tatcttgaat	caagttctct	ctcctcta	840
catggaagaa	atagacccat	aactagttat	tttgggtaaa	tgggagctat	ttaaaaaatt	900
gatatatttaa	aagcttaaat	gaaatgttaa	tcaaatatga	tttatgatta	ttttctttct	960
atgagtattc	tttaattgtg	gaaggcagtt	tcttaggaag	ggaacaaggg	ttctctttta	1020
caacccaaaag	tttggtgggtg	gttttttttt	cacaaaatta	ttgagttaa	aaaaattgat	1080
ggttgttttg	catttcacct	agtagcttat	tcaatgggtt	gtttttctgc	taaatgttaa	1140
ccgtcaaaac	ttgaattaat	ttcttaattg	ctatttctac	ttcaggaatc	ttaagaaaga	1200
tggcttaacc	cagtcagaag	ggacaagcat	aattttcttc	catggctatt	taagtaagta	1260
ttaggagagc	tttcacgacc	atgctatagc	ttcctagtga	cgcagaattg	gtaagacttg	1320
tgtgatatat	acatgtgtga	cttgttacat	atcatagcaa	ctgtgtagtg	ggaaggatgt	1380
aaacagttcg	atatcaagct	tatcgatacc	gtcgac			1416

<210> 103
 <211> 704
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (287)
 <223> n equals a,t,g, or c

<400> 103						
actgtgtctg	tcttgtctct	gatatttata	tgccattatg	tggcctctac	tgccttagga	60
ttctaatgtt	cccactaaga	tcagctaact	cagttccact	acagtgttta	ccaccatcat	120
ctctcgcaaa	caaagacagc	cacttcagag	ctcctaggaa	atagtgggtg	tcccatcatc	180
atgcatcttc	ttaatsacat	ggtgaaaatt	aacaatggct	aaggagcctt	tgtgttttct	240
cctctacaat	atgcccagga	atttctggca	tttggccat	cttattnata	ggctattact	300
gaattttmagc	ctmatcctmc	caaattatta	atgccaaaat	attaactctt	gattcttagg	360
tgagtgcacc	catgccaaata	aatttgccat	gatctaacct	taaatgtatt	ctcatatatg	420
ctgtccaagt	ttctrtctgat	taaaatggca	aggcctttag	ttctcctaca	taggttttct	480
ctctccagag	aaggcctcaa	ttctctgact	aggctatgtt	gggataatac	tggaggcact	540
aataggtagt	agggtaaaatt	ctttatttta	ttatttttgg	agacagggag	ggtcttgctt	600
tgttcagact	ggagtgcagt	ggtgtgatca	tggctcattg	caactttgaa	ctcctgggag	660
acagagcaag	actccatctc	aaaaaaaaaa	aaaaaaaaac	tcga		704

<210> 104
 <211> 1259
 <212> DNA
 <213> Homo sapiens

<400> 104						
gacggggacc	agagcacggt	cctggctgca	gaggccacaa	gtcacgctgt	ctctgagagc	60
cacggtggcc	tcatctctct	gccataaact	tgccaattat	cctgctgctg	cctcattgac	120
ttcgcaccca	ctcttccctc	tggaacagag	gacactctcg	ccagctctcc	ccatggcgga	180
tccttgtcta	gggtcaggcc	tctgtctcaa	agtcaccctt	ggggacacct	tctctgacca	240
gcccctcatt	cctatggcct	catgctgttt	ttattttctc	ctaggactta	gcacgtatcc	300
tagaaattaa	cctgtcggtg	tatctgtttt	cttgtctgtc	tctttccagt	ggaatgtcac	360
catcgcccag	gtggggattt	ttgtgtgttt	tgttcaactg	tgtacamcca	gccccagca	420
cagcgsctgt	ccaggacaag	tgcccagtaa	acacttgagg	agcaatgcaa	gcgtgcgtgc	480
atggataagt	awttctttss	cagatgaggg	ggctaaggtt	cagagaaggc	cctgggggtc	540
tcagactcat	agcccagtcg	tctttctgct	gacacgccct	ggtctctggg	gcagtttggt	600
gcctgttcag	caacaaagag	ggtgtgcctc	gttaggggtc	ctgcgtgcga	atcgagctcc	660
ctgcgtgtct	tggctggagg	tmacmaccct	ytctgtctca	gggcctgtaa	ttaccactta	720
ccttggtcaa	tgggtccgag	agattmccct	tgtaggcagg	gctgtggcca	gggtgctcac	780
ctggccccca	gsaggtccca	tgggcactgt	ctggccgggc	ttcatggctg	acattccagg	840
tacatttcta	gccctgggct	gccatgggca	gaggggtggg	agagggctcg	gggcttcagg	900
ctggacaaac	cagtcagcct	tcccagctgg	gccgcctgac	cacccacttc	ctgtggggct	960
ccttgaggcc	tggagggttg	aggggggtct	tgttcaaccc	ccacccatgc	cctcttccct	1020
tctctccctc	ggcaggtcgt	cccagcagyt	cctgcaaaaca	gacccccgac	ccaagccctt	1080

ccttctgset	ccactgccac	cactgctgct	catctctgct	ggcacagaag	tctcttccct	1140
ggtcttccag	aaatccctc	tccacactca	gccagaggga	gctattaaaa	ctgtgggcca	1200
gccccatca	gtccacagca	aaaaaaaaa	aaaaaaaaa	aaaaaaaaa	aaactcgag	1259

<210> 105
 <211> 1804
 <212> DNA
 <213> Homo sapiens

<400> 105						
ggcagagcag	acgcgkctcc	ttggagggag	tgcggtcttc	tagggaggca	tcgggctcct	60
aggggcttct	tggcggtgtg	ggtgggattg	gggtccgcgc	gccatggcct	tcactttcgc	120
tgcggttctgc	tacatgctgt	ctctggtgct	gtcgctgctg	ctcatcttct	tcgccatctg	180
gcacataaatt	gcctttgatg	agttaaggac	agatttttaag	agcccatag	accagtgcga	240
tctgttcat	gcgagggaaac	ggttgaggaa	catcgagcgc	atctgcttcc	ttctgcgaaa	300
gctgggtgctg	ccagaatact	ccatccatag	cctcttctgc	attatgttcc	tgtgtgcgca	360
agagtggctc	acgctggggc	tgaatgtccc	tctacttttc	tatcacttct	ggagggtatt	420
ccactgtcca	gcagatagct	cagaactagc	ctacgaccca	ccggtgggtca	tgaatgccga	480
cactttgagt	tactgtcaga	aggaggcckg	gtgtaagctg	gccttctatc	tcctctcctt	540
cttctactac	ctttactgca	tgatctacac	tttagtgagc	tcttaacgca	aagaccatgc	600
acatcatcag	agactgagat	gggagaggcc	tgagacggag	agggtgcattt	ctgctgggtga	660
ctggagaggag	gaccagaatg	aggatacgtg	agaaatagac	ccggcaggca	gtcagactga	720
atgggagctg	gaatcacgca	gcagctggga	gccgagttaa	ccttgctgtg	ctgtgtcacc	780
ctgtttgtca	atctttggca	ttcgaattcc	acacacgggg	tcctagagcc	cttctgagca	840
tcagtgtgtg	gggggagtag	gtgacgaaac	actagacctc	tcctgagaga	gaattgtctg	900
ttcctgaatc	cacttcattg	aacagcacct	tgcaagttca	aatgagtctc	tgggagtggg	960
ggctggaagg	ccacaagggt	cttgctaagg	aacagaatga	cccagagtca	aggccaagtc	1020
tgcaggagacc	tgttgaagac	ctcgagaatg	kcttggctgc	ccaagactct	tgktgccttt	1080
cttccaagcc	atggccatgc	cctttttctc	aaatgggarg	ggctggargg	tgtgtgggat	1140
ttgtcttcag	ctgcaaccag	ccttgagcct	gctgggctat	tttcagctga	ggaggggtga	1200
atatagggaaa	aatgcatttt	tgaaacrttt	gcaacatgat	caagggtgta	gttctccacc	1260
acataaattat	aactttgttt	ttgccacctc	aaaccatcac	agagtcttta	aatgcaaatc	1320
aattgggtcaa	tgctagtcaa	agctatgttc	ttacaaaaac	cccagacagc	tcagagctca	1380
gaaaatcctg	tggagtggct	gctctgtacc	gtgggcatcc	ggcagccagg	aagtgcagaca	1440
acataattat	aactttgttt	tatgatgctg	catcatttgt	actgtttagg	tcgacrtgag	1500
gacatcatct	tatttagaat	tttccgtttg	gcattctctt	ttgggtggga	gttatgctgg	1560
gggttgtaaa	taatgacaag	gctgagattt	ttatgatgtt	taaatggggc	acaatgattt	1620
tgaccttatt	ccccaaactt	ctttcttttt	ctactgttta	acatacacag	gctatttata	1680
cacgtcccca	gctcccatct	gaaacctgtg	actcagggtt	atgaatgggt	tttgtgtagc	1740
aacacattgt	gtgctatggt	tattaaaaatg	cagcgacaaa	aaaaaiaaaa	aaaaaaaact	1800
cgag						1804

<210> 106
 <211> 971
 <212> DNA
 <213> Homo sapiens

<400> 106						
ctagcccgagg	cggatccccc	gggctgcagg	cgccgaggct	ggaggccgag	ctctgcagag	60
ttacaattga	gactgctaac	ccctaccttt	gaagggatca	acggattggt	gttgaaacaa	120
cattttagttc	agaatccagt	cagactcttg	caacttttag	gtggtagctt	ctattttaac	180
acctcaagggt	tgaagcagaa	gaataaggag	aaggataagt	cgaaggggaa	ggcgccgtgaa	240
gaggacgaak	aggagaggag	acgccgtgag	cgggacgacc	agatgtaccg	agagcggctg	300
cgcaccttgc	tgggtcatcg	ggttgtcatg	agcctcctga	atgctctcag	caccagcgga	360
ggcagcatctt	cctggaacga	ctttgtccac	gagatgctgg	ccaagggcga	ggtgcagcgc	420
gtccagggtg	tgccctgagag	cgacgtggtg	gaagtctacc	tgacccctgg	agccgtggtg	480
tttgggaggc	ctcggttagc	cttgatgtac	cgaatgcagg	ttgcaaatat	tgacaagtgt	540
gaagagaagc	ttcgagcagc	tgaagatgag	ctgaatatcg	aggccaagga	caggatccca	600
gtttcctaca	agcgaacagg	attctttggg	aaatgccctg	tactctgtgg	ggatgacggy	660
agtgggcctg	gccatcctgt	ggtatgtttt	ccgtctggcc	gggatgactg	gaggcacccg	720
cggcgatgga	cgtccaggte	cgggtcctg	tgctggaaag	cgttgatggg	gagcgtcggc	780
gctgaccaca	ckcgggagct	gcggaagccc	agcgggtcac	acaggcctcc	cttcaacgta	840

gtcatccct	ggtggtggaa	gcaagacgac	ggccccctgac	gtgcagccac	acacagaaaa	900
ggctgctgtg	aaacatttta	atgcttcgac	tttttttttc	ttccagcctg	gagcaacaag	960
agcaaaactc	c					971

<210> 107
 <211> 821
 <212> DNA
 <213> Homo sapiens

<400> 107						
gtttttgagt	tgtgaattac	atatatgaac	atctgaraaa	atcctataag	cagtttaatc	60
aactgttcca	ctccactcca	agtgaagcca	taggcagaat	tgagttatgg	ggagagcggc	120
ctagtaataa	ttggtttgcg	taatacaaa	ttctactggg	tagtgatgtt	gtagaagtcc	180
atatagaatc	agctgagctt	tcagaaatgg	tgaaaggggt	gtaaatgtca	taacttagat	240
tgtaattttt	ttcccatagg	cttttaaaaa	atattcatga	ggttcttttt	ttatttcaat	300
agtttttggg	gaacaggttg	tttttgggta	catgataagt	tcttcagtgg	tgattttctga	360
gattttgggt	cacctgtcat	gtgagcagta	tgaactctac	tttatgtgta	gtccttatccc	420
tcatgtgtat	gaactccacc	ttatgtgtag	tcttatccct	caccactccc	tgcccttccc	480
cacaagtccc	caaagtccat	tatatgatct	ttatgccttt	acatcttcac	agtttagctc	540
tcacacaact	tattataatt	tataagtaag	ccagcattgg	atatagttgt	attccattat	600
taatttaaga	aaccttatgc	aagtaattat	tagtcatcat	ccccaaaaaa	agggagaaca	660
gggttagatt	cagaatactt	tgataagagc	taaatactat	catgagtgtc	gtcagtctgt	720
agtaactttc	cattggtatt	ctatgtcttt	taggcttaca	gatacttttt	acactcttac	780
aaaatgtgca	caagaagaag	ctgcagctca	gagctcgtgc	c		821

<210> 108
 <211> 1779
 <212> DNA
 <213> Homo sapiens

<400> 108						
aggaatacat	acgatccttg	tctaccagga	gtctaataga	aagatggaca	gcgtggaccc	60
tgccagcagc	caggccatgg	agctctctga	tgtaaccctc	attgaggggt	tgggtaatga	120
ggtgatgggt	gtggcaggtg	tggtggtgct	gattctagcc	ttggtcctag	cttggctctc	180
tacctacgta	gcagacagcg	gtagcaacca	gctcctgggc	gctattgtgt	cagcagggcg	240
cacatccgtc	ctccacctgg	ggcatgtgga	ccacctgggt	gcaggccaag	gcaaccocga	300
gccaactgaa	ctccccatc	catcagagga	caagcaggtg	caggcagcag	cagtcagag	360
gccccctga	gatctgagga	tagcacctgc	ctccctccca	gccctggcct	catcactgtg	420
cgggtcaaat	tcctcaatga	taccgaggag	ctggctgtgg	ctaggccaga	ggataccgtg	480
ggtgccctga	agagcaaata	cttccctgga	caagaaagcc	agatgaaact	gatctaccag	540
ggccgcctgc	tacaagaccc	agccccgaca	ctgcgttctc	tgaacattac	cgacaactgt	600
gtgatteact	gccaccgctc	acccccaggg	tcagctgttc	caggccctc	agcctccttg	660
gccccctcgg	ccactgagcc	acccagcctt	ggtgtcaatg	tgggcagcct	catggtgcct	720
gtctttgtgg	tgctgttggg	tggtgtctgg	tacttccgaa	tcaattaccg	ccaattcttc	780
acagcacctg	ccactgtctc	cctggtggga	gtcaccgtct	tcttcagctt	cctagtattt	840
gggatgtatg	gacgataagg	acataggaag	aaaaatgaa	gcatggcttt	tctcctttat	900
ggcctcccca	cttttccctg	ccagagctgg	gccccagggc	cggggaggga	ggggtggaaa	960
ggatgtgatg	gaaatctcct	ccataggaca	caggaggcaa	gtatgcccgc	tcccctctc	1020
atccacagga	gtacagatgt	cctcccggtg	cgagcacaac	tcaggtagaa	atgaggatgt	1080
catcttccct	cacttttagg	gtcctctgaa	ggagtcca	gctgctggcc	aagctcagtg	1140
gggagcctgg	gctctgagat	tccctccccc	ctgtgtgtct	gactcttccc	agtgctcctg	1200
atgtctgccc	ccagcaccca	gggctgcctg	caagggcagc	tcagcatggc	cccagcaca	1260
ctccgtaggg	agcctggagt	atccttccat	ttctcagcca	aatactcatc	ttttgagact	1320
gaaatcacac	tgccgggga	gaagattgtg	ccagccttct	cttatgggca	cctagccgcc	1380
ttcaccttct	tcctctaccc	cttagcagga	atagggtgtc	ctcccttctt	tcaaagcact	1440
ttgcttgcac	tttattttat	ttttttaaga	gtccttcata	gagctcagtc	aggaagggga	1500
tggggcacca	agccaagccc	ccagcattgg	gagcggccag	gccacagctg	ctgctcccg	1560
agtcctcagg	ctgtaagcaa	gagacagcac	tgccctctgg	ccagcgtcct	accctgccca	1620
actccaagga	ctgggtatgg	atygctgggc	cctaggctct	tgcttctggg	gctattggag	1680
ggtcagtgct	tgtagactgaa	taaagtcca	ttttgtggta	aaaaaaaaaa	aaaaaaaaaa	1740
aaaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	agggcggcc			1779

<210> 109
 <211> 1518
 <212> DNA
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (1146)
 <223> n equals a,t,g, or c

```
<400> 109
aggagaaact ctaaaaaactg cagatattat ttcatgctat atgttccatc ctctgatgag      60
aatgtgagga aagaaaattg tatcctgcat ggctgaaaat ggtcccctac aaaaaatatca      120
tgttggacaa ctaatctgag atagtggat ctctggaaag cagttagca ctggtgagtt      180
tggactttca tggcaggctg ccttggttca tatcttttgg taatgatact tatcctctgt      240
ragggccatt tctttatttg tggaaatgaa gacaatagag tgcttagata taatttasca      300
acaatgtccg tcacatagta aacacgtaat aaacggtagc tcttattgtt attattatta      360
ctattattac cttgaagaca ggggctctgt cttgttcac attccatctc cagctcttag      420
cacagtcctt ggcacaattc aaacatgtat ttggatgaat gacaaatagc tactgaatat      480
ttgcctctgt ccaagcattg ttagaggtag atgggacagg gcagtgaaca aaacagacaa      540
aacctcctgc tgtctcagag ttcacactct aatggggaga cccaggcaat gaggaataaa      600
ttaaataata caatgtgtct tatggcaata aatgacaaag aaaaataaag cagagggtgag      660
aaacagtggc agtggttttg tgatcatttg ctttgcaaca agccactccc caaagttagt      720
ggcctaaaac aatttaatca cagttcatgt tctggctaca acaatacaca tccctctcat      780
gtgcaaaata cactcactcc tccctcagag cctcgtacca ttaagggttc aggttcaaag      840
cttaagatct tatcctctga agtaggttta gggacaaaaca agtcttctca ggtacttctt      900
ctggggacac agagacttgt gaactaaaag acaagttacc taccttccaa cacaactgac      960
atgcaatggg gatataggaa aagataatth caataggcgc ttctgtgcaa aagcggggga      1020
aatgagagtc actcagcagt cacggttcat attaatctaa aatctagcca ggcatatata      1080
ccaagtcttc ctgatgtgag gacaagaatt atttcttgat tagggctcac ttwttctctt      1140
tgaggntggg tgcgctcagc ttttggtatt gtctctgaa tcatccttcc ttgtctataa      1200
aatgcatgta tatactcata catacataga gagaaagaga gagagagaga gagagagact      1260
ctgtcacgca ggctggagtg caatgggtgt atctcagctc actgcaacct acaactcctg      1320
ggttcaagca attctcctgt ctcagcctcc cgagcacctg tagtccctgc tactcaggag      1380
gctgaggcag gagaattgct tgaatccgag aggcagaggt tgtcagttag cagagattac      1440
accactgcac tccagcttgg gtgacagagc aaggcttcat ctcaaaaaaa gacaaaaaaa      1500
aaaaaaaaaa actcgtag                                     1518
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<210> 110
 <211> 921
 <212> DNA
 <213> Homo sapiens

```
<400> 110
ggcacgagac gccgtgagcg ggacgaccag atgtaccgag agcgggctgcg caccttgctg      60
gtcatcgcgg ttgtcatgag cctctgaat gctctcagca ccagcgagg cagcatttcc      120
tggaacgact ttgtccacga gatgctggcc aagggcgagg tgcagcgcgt ccagtggtg      180
cctgagagcg acgtggtgga agtctacctg caccctggag ccgtgtgtgt tgggaggcct      240
cggctagcct tgatgtaccg aatgcagttg caaatattga caagtttgaa gagaagcttc      300
gagcagctga agatgagctg aatctcaggg ccaaggacag gatcccagtt tcctacaagc      360
gaacaggatt ctttgggaaa tgccctgtac tctgtgggga tgacggtagt gggcctggcc      420
atctctgtgt atgttttccg tctggccggg atgactggag gcaccgccgg cgatggacgt      480
ccatgtcccc gctcctgtgc tggaaagcgt tgatggggag cgtcggcgct gaccacacgc      540
gggagctgcg gaagcccagc ggttcacaca ggctccctt caacgtagtc atccccctgt      600
ggtggaagca agacgacggc ccctgacgtg cagccacaca cagaaaaggc tgcgtggaac      660
attttatgct tcgacttttt ttttcttcag agacagggtg tcgttctgtc gccaggctg      720
gagtgcagtg ccaccatcat agctcactgc agcctccacc tcctaggctc aagcttccta      780
agtagttggg actcaaggct tgagtcacca tgccaggctc tgttttttca gtctgtgaaa      840
aataaaagtca tcagcatgtg aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa      900
aaaaaaaaaa aaaaaaaaaa a                                     921
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<210> 111
 <211> 244
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (244)
 <223> Xaa equals stop translation

<400> 111
 Met Gly Thr Leu Pro Trp Leu Leu Ala Phe Phe Ile Leu Gly Leu Gln
 1 5 10 15
 Ala Trp Asp Thr Pro Thr Ile Val Ser Arg Lys Glu Trp Gly Ala Arg
 20 25 30
 Pro Leu Ala Cys Arg Ala Leu Leu Thr Leu Pro Val Ala Tyr Ile Ile
 35 40 45
 Thr Asp Gln Leu Pro Gly Met Gln Cys Gln Gln Gln Ser Val Cys Ser
 50 55 60
 Gln Met Leu Arg Gly Leu Gln Ser His Ser Val Tyr Thr Ile Gly Trp
 65 70 75 80
 Cys Asp Val Ala Tyr Asn Phe Leu Val Gly Asp Asp Gly Arg Val Tyr
 85 90 95
 Glu Gly Val Gly Trp Asn Ile Gln Gly Leu His Thr Gln Gly Tyr Asn
 100 105 110
 Asn Ile Ser Leu Gly Ile Ala Phe Phe Gly Asn Lys Ile Ser Ser Ser
 115 120 125
 Pro Ser Pro Ala Ala Leu Ser Ala Ala Glu Gly Leu Ile Ser Tyr Ala
 130 135 140
 Ile Gln Lys Gly His Leu Ser Pro Arg Tyr Ile Gln Pro Leu Leu Leu
 145 150 155 160
 Lys Glu Glu Thr Cys Leu Asp Pro Gln His Pro Val Met Pro Arg Lys
 165 170 175
 Val Cys Pro Asn Ile Ile Lys Arg Ser Ala Trp Glu Ala Arg Glu Thr
 180 185 190
 His Cys Pro Lys Met Asn Leu Pro Ala Lys Tyr Val Ile Ile Ile His
 195 200 205
 Thr Ala Gly Thr Ser Cys Thr Val Ser Thr Asp Cys Gln Thr Val Val
 210 215 220
 Arg Asn Ile Gln Ser Phe His Met Asp Thr Arg Asn Phe Cys Asp Ile
 225 230 235 240
 Gly Tyr Gln Xaa

<210> 112
 <211> 42
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (42)
 <223> Xaa equals stop translation

<400> 112
 Met Lys Arg Arg Glu Met Thr Gln Phe Leu Leu Ser Leu Val Ala Leu
 1 5 10 15
 Asn Cys Cys Ser Ile Ser Leu Gly Arg Leu Thr Tyr Pro Gly Gly Phe
 20 25 30
 His Leu Lys Leu Asp Pro Leu Glu Leu Xaa
 35 40

<210> 113
 <211> 527
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (466)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (527)
 <223> Xaa equals stop translation

<400> 113
 Met Ala Ala Leu Thr Ile Ala Thr Gly Thr Gly Asn Trp Phe Ser Ala
 1 5 10 15
 Leu Ala Leu Gly Val Thr Leu Leu Lys Cys Leu Leu Ile Pro Thr Tyr
 20 25 30
 His Ser Thr Asp Phe Glu Val His Arg Asn Trp Leu Ala Ile Thr His
 35 40 45
 Ser Leu Pro Ile Ser Gln Trp Tyr Tyr Glu Ala Thr Ser Glu Trp Thr
 50 55 60
 Leu Asp Tyr Pro Pro Phe Phe Ala Trp Phe Glu Tyr Ile Leu Ser His
 65 70 75 80
 Val Ala Lys Tyr Phe Asp Gln Glu Met Leu Asn Val His Asn Leu Asn
 85 90 95
 Tyr Ser Ser Ser Arg Thr Leu Leu Phe Gln Arg Phe Ser Val Ile Phe
 100 105 110
 Met Asp Val Leu Phe Val Tyr Ala Val Arg Glu Cys Cys Lys Cys Ile
 115 120 125
 Asp Gly Lys Lys Val Gly Lys Glu Leu Thr Glu Lys Pro Lys Phe Ile
 130 135 140
 Leu Ser Val Leu Leu Leu Trp Asn Phe Gly Leu Leu Ile Val Asp His
 145 150 155 160
 Ile His Phe Gln Tyr Asn Gly Phe Leu Phe Gly Leu Met Leu Leu Ser

165										170					175				
Ile	Ala	Arg	Leu	Phe	Gln	Lys	Arg	His	Met	Glu	Gly	Ala	Phe	Leu	Phe				
			180					185						190					
Ala	Val	Leu	Leu	His	Phe	Lys	His	Ile	Tyr	Leu	Tyr	Val	Ala	Pro	Ala				
		195					200					205							
Tyr	Gly	Val	Tyr	Leu	Leu	Arg	Ser	Tyr	Cys	Phe	Thr	Ala	Asn	Lys	Pro				
	210					215					220								
Asp	Gly	Ser	Ile	Arg	Trp	Lys	Ser	Phe	Ser	Phe	Val	Arg	Val	Ile	Ser				
225					230					235					240				
Leu	Gly	Leu	Val	Val	Phe	Leu	Val	Ser	Ala	Leu	Ser	Leu	Gly	Pro	Phe				
				245					250					255					
Leu	Ala	Leu	Asn	Gln	Leu	Pro	Gln	Val	Phe	Ser	Arg	Leu	Phe	Pro	Phe				
			260					265					270						
Lys	Arg	Gly	Leu	Cys	His	Ala	Tyr	Trp	Ala	Pro	Asn	Phe	Trp	Ala	Leu				
		275					280					285							
Tyr	Asn	Ala	Leu	Asp	Lys	Val	Leu	Ser	Val	Ile	Gly	Leu	Lys	Leu	Lys				
	290					295					300								
Phe	Leu	Asp	Pro	Asn	Asn	Ile	Pro	Lys	Ala	Ser	Met	Thr	Ser	Gly	Leu				
305					310					315					320				
Val	Gln	Gln	Phe	Gln	His	Thr	Val	Leu	Pro	Ser	Val	Thr	Pro	Leu	Ala				
				325					330					335					
Thr	Leu	Ile	Cys	Thr	Leu	Ile	Ala	Ile	Leu	Pro	Ser	Ile	Phe	Cys	Leu				
			340					345					350						
Trp	Phe	Lys	Pro	Gln	Gly	Pro	Arg	Gly	Phe	Leu	Arg	Cys	Leu	Thr	Leu				
		355					360					365							
Cys	Ala	Leu	Ser	Ser	Phe	Met	Phe	Gly	Trp	His	Val	His	Glu	Lys	Ala				
	370					375					380								
Ile	Leu	Leu	Ala	Ile	Leu	Pro	Met	Ser	Leu	Leu	Ser	Val	Gly	Lys	Ala				
385					390					395					400				
Gly	Asp	Ala	Ser	Ile	Phe	Leu	Ile	Leu	Thr	Thr	Thr	Gly	His	Tyr	Ser				
				405					410					415					
Leu	Phe	Pro	Leu	Leu	Phe	Thr	Ala	Pro	Glu	Leu	Pro	Ile	Lys	Ile	Leu				
			420					425					430						
Leu	Met	Leu	Leu	Phe	Thr	Ile	Tyr	Ser	Ile	Ser	Ser	Leu	Lys	Thr	Leu				
		435					440					445							
Phe	Arg	Lys	Glu	Lys	Pro	Leu	Phe	Asn	Trp	Met	Glu	Thr	Phe	Tyr	Leu				
	450					455					460								
Leu	Xaa	Leu	Gly	Pro	Leu	Glu	Val	Cys	Cys	Glu	Phe	Val	Phe	Pro	Phe				
465					470					475					480				
Thr	Ser	Trp	Lys	Val	Lys	Tyr	Pro	Phe	Ile	Pro	Leu	Leu	Leu	Thr	Ser				
				485					490					495					
Val	Tyr	Cys	Ala	Val	Gly	Ile	Thr	Tyr	Ala	Trp	Phe	Lys	Leu	Tyr	Val				
			500					505					510						

Ser Val Leu Ile Asp Ser Ala Ile Gly Lys Thr Lys Lys Gln Xaa
515 520 525

<210> 114
<211> 354
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (98)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (100)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (109)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (123)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (129)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (131)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (159)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (169)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (171)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (172)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (175)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (183)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (188)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (189)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (225)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (229)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (231)
 <223> Xaa equals any of the naturally occurring L-amino acids

<400> 114
 Met Glu Asp Gly Val Leu Lys Glu Gly Phe Leu Val Lys Arg Gly His
 1 5 10 15
 Ile Val His Asn Trp Lys Ala Arg Trp Phe Ile Leu Arg Gln Asn Thr
 20 25 30
 Leu Val Tyr Tyr Lys Leu Glu Gly Gly Arg Arg Val Thr Pro Pro Lys
 35 40 45
 Gly Arg Ile Leu Leu Asp Gly Cys Thr Ile Thr Cys Pro Cys Leu Glu
 50 55 60
 Tyr Glu Asn Arg Pro Leu Leu Ile Lys Leu Lys Thr Gln Thr Ser Thr
 65 70 75 80
 Glu Tyr Phe Leu Glu Ala Cys Ser Arg Glu Glu Ala Gly Cys Leu Gly
 85 90 95
 Leu Xaa Arg Xaa Pro Gly Leu Phe Met Gln Gly Ser Xaa Gly Lys Val
 100 105 110
 Gln Gln Leu His Ser Leu Arg Asn Ser Phe Xaa Leu Pro Pro His Ile
 115 120 125
 Xaa Leu Xaa Arg Ile Val Asp Lys Met His Asp Ser Asn Thr Gly Ile
 130 135 140
 Arg Ser Ser Pro Asn Met Glu Gln Arg Ser Thr Tyr Lys Lys Xaa Phe
 145 150 155 160
 Leu Gly Ser Ser Leu Val Asp Trp Xaa Ile Xaa Xaa Ser Phe Xaa Gly
 165 170 175

Ser Arg Leu Glu Ala Val Xaa Leu Ala Ser Met Xaa Xaa Glu Glu Asn
 180 185 190
 Phe Leu Arg Ser Val Ala Val Arg Cys Met Gly Gly Ile Arg Ser Gly
 195 200 205
 Asp Leu Ala Glu Gln Phe Leu Asp Asp Ser Thr Ala Leu Tyr Thr Phe
 210 215 220
 Xaa Glu Ser Tyr Xaa Lys Xaa Ile Ser Pro Lys Glu Glu Ile Ser Leu
 225 230 235 240
 Ser Thr Val Glu Leu Ser Gly Thr Val Val Lys Gln Gly Tyr Leu Ala
 245 250 255
 Lys Gln Gly His Lys Arg Lys Asn Trp Lys Val Arg Arg Phe Val Leu
 260 265 270
 Arg Lys Asp Pro Ala Phe Leu His Tyr Tyr Asp Pro Ser Lys Glu Glu
 275 280 285
 Asn Arg Pro Val Gly Gly Phe Ser Leu Arg Gly Ser Leu Val Ser Ala
 290 295 300
 Leu Glu Asp Asn Gly Val Pro Thr Gly Val Lys Gly Asn Val Gln Gly
 305 310 315 320
 Asn Leu Phe Lys Val Ile Thr Lys Asp Asp Thr His Tyr Tyr Ile Gln
 325 330 335
 Ala Ser Ser Lys Ala Glu Arg Ala Glu Trp Ile Glu Ala Ile Lys Lys
 340 345 350
 Leu Thr

<210> 115
 <211> 64
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (64)
 <223> Xaa equals stop translation

<400> 115
 Met Trp Lys Arg Val Cys Val Cys Val Phe Leu Tyr Ile Ala Trp Val
 1 5 10 15
 Gln Leu Trp Met Cys Ala Lys Glu Cys Glu Cys Val Cys Val Cys Val
 20 25 30
 Lys Gly Ser Val Leu Glu Pro Thr Ser Val Cys Cys Glu Ser Gly Lys
 35 40 45
 Arg Val Gly Glu Gly Arg Glu Met Leu Thr Leu Val Gly Ala Gly Xaa
 50 55 60

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<210> 116
<211> 310
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (129)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (178)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (187)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (262)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (308)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (310)
<223> Xaa equals stop translation

<400> 116
Met Phe Thr Ile Lys Leu Leu Leu Phe Ile Val Pro Leu Val Ile Ser
  1             5             10             15

Ser Arg Ile Asp Gln Asp Asn Ser Ser Phe Asp Ser Leu Ser Pro Glu
      20             25             30

Pro Lys Ser Arg Phe Ala Met Leu Asp Asp Val Lys Ile Leu Ala Asn
      35             40             45

Gly Leu Leu Gln Leu Gly His Gly Leu Lys Asp Phe Val His Lys Thr
   50             55             60

Lys Gly Gln Ile Asn Asp Ile Phe Gln Lys Leu Asn Ile Phe Asp Gln
   65             70             75             80

Ser Phe Tyr Asp Leu Ser Leu Gln Thr Ser Glu Ile Lys Glu Glu Glu
      85             90             95

Lys Glu Leu Arg Arg Thr Thr Tyr Lys Leu Gln Val Lys Asn Glu Glu
      100            105            110

Val Lys Asn Met Ser Leu Glu Leu Asn Ser Lys Leu Glu Ser Leu Leu
      115            120            125

Xaa Glu Lys Ile Leu Leu Gln Lys Val Lys Tyr Leu Glu Glu Gln
      130            135            140

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Leu Thr Asn Leu Ile Gln Asn Gln Pro Glu Thr Pro Glu His Pro Glu
 145 150 155 160
 Val Thr Ser Leu Lys Thr Phe Val Glu Lys Gln Asp Asn Ser Ile Lys
 165 170 175
 Asp Xaa Leu Gln Thr Val Glu Asp Gln Tyr Xaa Gln Leu Asn Gln Gln
 180 185 190
 His Ser Gln Ile Lys Glu Ile Glu Asn Gln Leu Arg Arg Thr Ser Ile
 195 200 205
 Gln Glu Pro Thr Glu Ile Ser Leu Ser Ser Lys Pro Arg Ala Pro Arg
 210 215 220
 Thr Thr Pro Phe Leu Gln Leu Asn Glu Ile Arg Asn Val Lys His Asp
 225 230 235 240
 Gly Ile Pro Ala Glu Cys Thr Thr Ile Tyr Asn Arg Gly Glu His Thr
 245 250 255
 Ser Gly Met Tyr Ala Xaa Arg Pro Ser Asn Ser Gln Val Phe His Val
 260 265 270
 Tyr Cys Asp Val Ile Ser Gly Ser Pro Trp Thr Leu Ile Gln His Arg
 275 280 285
 Ile Asp Gly Ser Gln Asn Phe Asn Glu Thr Trp Glu Asn Tyr Lys Tyr
 290 295 300
 Gly Phe Gly Xaa Ala Xaa
 305 310

<210> 117

<211> 212

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (99)

<223> Xaa equals any of the naturally occurring L-amino acids

<220>

<221> SITE

<222> (212)

<223> Xaa equals stop translation

<400> 117

Met Ala Asn Ala Gly Leu Gln Leu Leu Gly Phe Ile Leu Ala Phe Leu
 1 5 10 15
 Gly Trp Ile Gly Ala Ile Val Ser Thr Ala Leu Pro Gln Trp Arg Ile
 20 25 30
 Tyr Ser Tyr Ala Gly Asp Asn Ile Val Thr Ala Gln Ala Met Tyr Glu
 35 40 45
 Gly Leu Trp Met Ser Cys Val Ser Gln Ser Thr Gly Gln Ile Gln Cys
 50 55 60
 Lys Val Phe Asp Ser Leu Leu Asn Leu Ser Ser Thr Leu Gln Ala Thr
 65 70 75 80

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<210> 118
<211> 51
<212> PRT
<213> Homo sapiens
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```
<220>  
<221> SITE  
<222> (51)  
<223> Xaa equals stop translation
```

```
<210> 119
<211> 263
<212> PRT
<213> Homo sapiens
```

```
<220>
<221> SITE
<222> (263)
<223> Xaa equals stop translation
```

<400> 119


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Met Leu Phe Ser Ala Leu Leu Leu Glu Val Ile Trp Ile Leu Ala Ala
 1           5           10           15
Asp Gly Gly Gln His Trp Thr Tyr Glu Gly Pro His Gly Gln Asp His
          20           25           30
Trp Pro Ala Ser Tyr Pro Glu Cys Gly Asn Asn Ala Gln Ser Pro Ile
          35           40           45
Asp Ile Gln Thr Asp Ser Val Thr Phe Asp Pro Asp Leu Pro Ala Leu
 50           55           60
Gln Pro His Gly Tyr Asp Gln Pro Gly Thr Glu Pro Leu Asp Leu His
 65           70           75           80
Asn Asn Gly His Thr Val Gln Leu Ser Leu Pro Ser Thr Leu Tyr Leu
          85           90           95
Gly Gly Leu Pro Arg Lys Tyr Val Ala Ala Gln Leu His Leu His Trp
          100          105          110
Gly Gln Lys Gly Ser Pro Gly Gly Ser Glu His Gln Ile Asn Ser Glu
          115          120          125
Ala Thr Phe Ala Glu Leu His Ile Val His Tyr Asp Ser Asp Ser Tyr
          130          135          140
Asp Ser Leu Ser Glu Ala Ala Glu Arg Pro Gln Gly Leu Ala Val Leu
          145          150          155          160
Gly Ile Leu Ile Glu Leu Glu Lys Leu Gln Gly Thr Leu Phe Ser Thr
          165          170          175
Glu Glu Glu Pro Ser Lys Leu Leu Val Gln Asn Tyr Arg Ala Leu Gln
          180          185          190
Pro Leu Asn Gln Arg Met Val Phe Ala Ser Phe Ile Gln Ala Gly Ser
          195          200          205
Ser Tyr Thr Thr Gly Glu Met Leu Ser Leu Gly Val Gly Ile Leu Val
          210          215          220
Gly Cys Leu Cys,Leu Leu Leu Ala Val Tyr Phe Ile Ala Arg Lys Ile
          225          230          235          240
Arg Lys Lys Arg Leu Glu Asn Arg Lys Ser Val Val Phe Thr Ser Ala
          245          250          255
Gln Ala Thr Thr Glu Ala Xaa
          260

```

<210> 120

<211> 270

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (27)

<223> Xaa equals any of the naturally occurring L-amino acids

<400> 120

Met His Tyr Tyr Arg Tyr Ser Asn Ala Lys Val Ser Cys Trp Tyr Lys

```

      1             5             10             15
Tyr Leu Leu Phe Ser Tyr Asn Ile Ile Phe Xaa Leu Ala Gly Val Val
      20             25             30
Phe Leu Gly Val Gly Leu Trp Ala Trp Ser Glu Lys Gly Val Leu Ser
      35             40             45
Asp Leu Thr Lys Val Thr Arg Met His Gly Ile Asp Pro Val Val Leu
      50             55             60
Val Leu Met Val Gly Val Val Met Phe Thr Leu Gly Phe Ala Gly Cys
      65             70             75             80
Val Gly Ala Leu Arg Glu Asn Ile Cys Leu Leu Asn Phe Phe Cys Gly
      85             90             95
Thr Ile Val Leu Ile Phe Phe Leu Glu Leu Ala Val Ala Val Leu Ala
      100            105            110
Phe Leu Phe Gln Asp Trp Val Arg Asp Arg Phe Arg Glu Phe Phe Glu
      115            120            125
Ser Asn Ile Lys Ser Tyr Arg Asp Asp Ile Asp Leu Gln Asn Leu Ile
      130            135            140
Asp Ser Leu Gln Lys Ala Asn Gln Cys Cys Gly Ala Tyr Gly Pro Glu
      145            150            155            160
Asp Trp Asp Leu Asn Val Tyr Phe Asn Cys Ser Gly Ala Ser Tyr Ser
      165            170            175
Arg Glu Lys Cys Gly Val Pro Phe Ser Cys Cys Val Pro Asp Pro Ala
      180            185            190
Gln Lys Val Val Asn Thr Gln Cys Gly Tyr Asp Val Arg Ile Gln Leu
      195            200            205
Lys Ser Lys Trp Asp Glu Ser Ile Phe Thr Lys Gly Cys Ile Gln Ala
      210            215            220
Leu Glu Ser Trp Leu Pro Arg Asn Ile Tyr Ile Val Ala Gly Val Phe
      225            230            235            240
Ile Ala Ile Ser Leu Leu Gln Ile Phe Gly Ile Phe Leu Ala Arg Thr
      245            250            255
Leu Ile Ser Asp Ile Glu Ala Val Lys Ala Gly His His Phe
      260            265            270

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<210> 121

<211> 92

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (92)

<223> Xaa equals stop translation

<400> 121

```

Met Leu Arg Cys Gly Gly Arg Gly Leu Leu Leu Gly Leu Ala Val Ala
  1             5             10             15

```

Ala Ala Ala Val Met Ala Ala Arg Leu Met Gly Trp Trp Gly Pro Arg
 20 25 30
 Ala Gly Phe Arg Leu Phe Ile Pro Glu Glu Leu Ser Arg Tyr Arg Gly
 35 40 45
 Gly Pro Gly Asp Pro Gly Leu Tyr Leu Ala Leu Leu Gly Arg Val Tyr
 50 55 60
 Asp Val Ser Ser Gly Arg Ser Thr Thr Ser Leu Gly Pro Thr Ile Ala
 65 70 75 80
 Ala Ser Gln Ala Glu Thr His Pro Glu Leu Ser Xaa
 85 90

<210> 122
 <211> 223
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (120)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (223)
 <223> Xaa equals stop translation

<400> 122
 Met Leu Trp Leu Leu Phe Phe Leu Val Thr Ala Ile His Ala Glu Leu
 1 5 10 15
 Cys Gln Pro Gly Ala Glu Asn Ala Phe Lys Val Arg Leu Ser Ile Arg
 20 25 30
 Thr Ala Leu Gly Asp Lys Ala Tyr Ala Trp Asp Thr Asn Glu Glu Tyr
 35 40 45
 Leu Phe Lys Ala Met Val Ala Phe Ser Met Arg Lys Val Pro Asn Arg
 50 55 60
 Glu Ala Thr Glu Ile Ser His Val Leu Leu Cys Asn Val Thr Gln Arg
 65 70 75 80
 Val Ser Phe Trp Phe Val Val Thr Asp Pro Ser Lys Asn His Thr Leu
 85 90 95
 Pro Ala Val Glu Val Gln Ser Ala Ile Arg Met Asn Lys Asn Arg Ile
 100 105 110
 Asn Asn Ala Phe Phe Leu Asn Xaa Gln Thr Leu Glu Phe Leu Lys Ile
 115 120 125
 Pro Ser Thr Leu Ala Pro Pro Met Asp Pro Ser Val Pro Ile Trp Ile
 130 135 140
 Ile Ile Phe Gly Val Ile Phe Cys Ile Ile Ile Val Ala Ile Ala Leu
 145 150 155 160
 Leu Ile Leu Ser Gly Ile Trp Gln Arg Arg Arg Lys Asn Lys Glu Pro

```

<210> 123
<211> 202
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (202)
<223> Xaa equals stop translation

<400> 123
Met Phe Phe Leu Gly Ala Val Leu Cys Leu Ser Phe Ser Trp Leu Phe
  1          5          10          15
His Thr Val Tyr Cys His Ser Glu Lys Val Ser Arg Thr Phe Ser Lys
          20          25          30
Leu Asp Tyr Ser Gly Ile Ala Leu Leu Ile Met Gly Ser Phe Val Pro
          35          40          45
Trp Leu Tyr Tyr Ser Phe Tyr Cys Ser Pro Gln Pro Arg Leu Ile Tyr
          50          55          60
Leu Ser Ile Val Cys Val Leu Gly Ile Ser Ala Ile Ile Val Ala Gln
  65          70          75          80
Trp Asp Arg Phe Ala Thr Pro Lys His Arg Gln Thr Arg Ala Gly Val
          85          90          95
Phe Leu Gly Leu Gly Leu Ser Gly Val Val Pro Thr Met His Phe Thr
          100          105          110
Ile Ala Glu Gly Phe Val Lys Ala Thr Thr Val Gly Gln Met Gly Trp
          115          120          125
Phe Phe Leu Met Ala Val Met Tyr Ile Thr Gly Ala Gly Leu Tyr Ala
          130          135          140
Ala Arg Ile Pro Glu Arg Phe Phe Pro Gly Lys Phe Asp Ile Trp Phe
  145          150          155          160
Gln Ser His Gln Ile Phe His Val Leu Val Val Ala Ala Ala Phe Val
          165          170          175
His Phe Tyr Gly Val Ser Asn Leu Gln Glu Phe Arg Tyr Gly Leu Glu
          180          185          190
Gly Gly Cys Thr Asp Asp Thr Leu Leu Xaa
          195          200

```

<210> 124

<211> 47
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (47)
 <223> Xaa equals stop translation

<400> 124
 Met Gly Arg Gln Ala Leu Leu Leu Leu Ala Leu Cys Ala Thr Gly Ala
 1 5 10 15
 Gln Gly Leu Tyr Phe His Ile Gly Glu Thr Glu Lys Arg Cys Phe Ile
 20 25 30
 Glu Glu Ile Pro Asp Glu Thr Met Val Ile Gly Gln Ala Gly Xaa
 35 40 45

<210> 125
 <211> 306
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (11)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (306)
 <223> Xaa equals stop translation

<400> 125
 Met Ala Leu Cys Ala Leu Thr Arg Ala Leu Xaa Ser Leu Asn Leu Ala
 1 5 10 15
 Pro Pro Thr Val Ala Ala Pro Ala Pro Ser Leu Phe Pro Ala Ala Gln
 20 25 30
 Met Met Asn Asn Gly Leu Leu Gln Gln Pro Ser Ala Leu Met Leu Leu
 35 40 45
 Pro Cys Arg Pro Val Leu Thr Ser Val Ala Leu Asn Ala Asn Phe Val
 50 55 60
 Ser Trp Lys Ser Arg Thr Lys Tyr Thr Ile Thr Pro Val Lys Met Arg
 65 70 75 80
 Lys Ser Gly Gly Arg Asp His Thr Gly Arg Ile Arg Val His Gly Ile
 85 90 95
 Gly Gly Gly His Lys Gln Arg Tyr Arg Met Ile Asp Phe Leu Arg Phe
 100 105 110
 Arg Pro Glu Glu Thr Lys Ser Gly Pro Phe Glu Glu Lys Val Ile Gln
 115 120 125
 Val Arg Tyr Asp Pro Cys Arg Ser Ala Asp Ile Ala Leu Val Ala Gly
 130 135 140
 Gly Ser Arg Lys Arg Trp Ile Ile Ala Thr Glu Asn Met Gln Ala Gly

```

<210> 126
<211> 82
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (82)
<223> Xaa equals stop translation

<400> 126
Met Asn Gln Leu Met Phe Gln Asp Leu Leu Cys Cys Leu Cys Leu Phe
  1                               5                               10                               15

Val Ile Gly Leu Ile Ser Leu Leu Arg Lys Thr Tyr Ser Cys Val Asn
      20                               25                               30

Leu Cys Lys Val Met Leu Pro Val Lys Lys Tyr Ser Thr Val Ser Thr
      35                               40                               45

Val Leu Cys Arg Asn Met Lys Leu Asn Gly Lys Asn Val Leu Met Phe
      50                               55                               60

Val Val Met Leu Leu Gly Gln Trp Met Gly Lys Leu Pro Lys Leu Ser
      65                               70                               75                               80

Pro Xaa

```

<210> 127

<211> 243
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (88)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (139)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (243)
 <223> Xaa equals stop translation

<400> 127
 Met Glu Gln Ala Arg Lys Ser Ser Thr Val Ser Leu Leu Ile Thr Val
 1 5 10 15
 Leu Phe Ala Val Ala Phe Ser Val Leu Leu Leu Ser Cys Lys Asp His
 20 25 30
 Val Gly Tyr Ile Phe Thr Thr Asp Arg Asp Ile Ile Asn Leu Val Ala
 35 40 45
 Gln Val Val Pro Ile Tyr Ala Val Ser His Leu Phe Glu Ala Leu Ala
 50 55 60
 Cys Thr Ser Gly Gly Val Leu Arg Gly Ser Gly Asn Gln Lys Val Gly
 65 70 75 80
 Ala Ile Val Asn Thr Ile Gly Xaa Tyr Val Val Gly Leu Pro Ile Gly
 85 90 95
 Ile Ala Leu Met Phe Ala Thr Thr Leu Gly Val Met Gly Leu Trp Ser
 100 105 110
 Gly Ile Ile Ile Cys Thr Val Phe Gln Ala Val Cys Phe Leu Gly Phe
 115 120 125
 Ile Ile Gln Leu Asn Trp Lys Lys Ala Cys Xaa Gln Ala Gln Val His
 130 135 140
 Ala Asn Leu Lys Val Asn Asn Val Pro Arg Ser Gly Asn Ser Ala Leu
 145 150 155 160
 Pro Gln Asp Pro Leu His Pro Gly Cys Pro Glu Asn Leu Glu Gly Ile
 165 170 175
 Leu Thr Asn Asp Val Gly Lys Thr Gly Glu Pro Gln Ser Asp Gln Gln
 180 185 190
 Met Arg Gln Glu Glu Pro Leu Pro Glu His Pro Gln Asp Gly Ala Lys
 195 200 205
 Leu Ser Arg Lys Gln Leu Val Leu Arg Arg Gly Leu Leu Leu Gly
 210 215 220
 Val Phe Leu Ile Leu Leu Val Gly Ile Leu Val Arg Phe Tyr Val Arg
 225 230 235 240

Ile Gln Xaa

<210> 128

<211> 285

<212> PRT

<213> Homo sapiens

<400> 128

```

Met Val Val Ala Gly Val Val Val Leu Ile Leu Ala Leu Val Leu Ala
 1              5              10              15

Trp Leu Ser Thr Tyr Val Ala Asp Ser Gly Ser Asn Gln Leu Leu Gly
      20              25              30

Ala Ile Val Ser Ala Gly Asp Thr Ser Val Leu His Leu Gly His Val
      35              40              45

Asp His Leu Val Ala Gly Gln Gly Asn Pro Glu Pro Thr Glu Leu Pro
 50              55              60

His Pro Ser Glu Gly Asn Asp Glu Lys Ala Glu Glu Ala Gly Glu Gly
 65              70              75              80

Arg Gly Asp Ser Thr Gly Glu Ala Gly Ala Gly Gly Gly Val Glu Pro
      85              90              95

Ser Leu Glu His Leu Leu Asp Ile Gln Gly Leu Pro Lys Arg Gln Ala
      100              105              110

Gly Ala Gly Ser Ser Ser Pro Glu Ala Pro Leu Arg Ser Glu Asp Ser
      115              120              125

Thr Cys Leu Pro Pro Ser Pro Gly Leu Ile Thr Val Arg Leu Lys Phe
      130              135              140

Leu Asn Asp Thr Glu Glu Leu Ala Val Ala Arg Pro Glu Asp Thr Val
      145              150              155              160

Gly Ala Leu Lys Ser Lys Tyr Phe Pro Gly Gln Glu Ser Gln Met Lys
      165              170              175

Leu Ile Tyr Gln Gly Arg Leu Leu Gln Asp Pro Ala Arg Thr Leu Arg
      180              185              190

Ser Leu Asn Ile Thr Asp Asn Cys Val Ile His Cys His Arg Ser Pro
      195              200              205

Pro Gly Ser Ala Val Pro Gly Pro Ser Ala Ser Leu Ala Pro Ser Ala
      210              215              220

Thr Glu Pro Pro Ser Leu Gly Val Asn Val Gly Ser Leu Met Val Pro
      225              230              235              240

Val Phe Val Val Leu Leu Gly Val Val Trp Tyr Phe Arg Ile Asn Tyr
      245              250              255

Arg Gln Phe Phe Thr Ala Pro Ala Thr Val Ser Leu Val Gly Val Thr
      260              265              270

Val Phe Phe Ser Phe Leu Val Phe Gly Met Tyr Gly Arg
      275              280              285

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<210> 129
 <211> 158
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (114)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (119)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (120)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (121)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (158)
 <223> Xaa equals stop translation

<400> 129
 Met Asp Ala Met Ile Leu Leu Asn Val Leu Ala Leu Thr Arg Leu Ala
 1 5 10 15
 Lys Ala Ala Ala Thr Asn Phe Val Ala Gln Gly Arg Gly Thr Ile Ile
 20 25 30
 Asn Ile Gly Ser Ile Val Ala Leu Ala Pro Lys Val Leu Asn Gly Val
 35 40 45
 Tyr Gly Gly Thr Lys Ala Phe Val Gln Ala Phe Ser Glu Ser Leu Gln
 50 55 60
 His Glu Leu Ser Asp Lys Gly Val Val Val Gln Val Val Leu Pro Gly
 65 70 75 80
 Ala Thr Ala Thr Glu Phe Trp Asp Ile Ala Gly Leu Pro Val Lys Gln
 85 90 95
 Pro Ala Gly Ser His Gly Asp Asp His Arg Lys Pro Gly Gly Arg Arg
 100 105 110
 Pro Xaa Arg Pro Cys Pro Xaa Xaa Xaa Val Thr Ile Pro Ser Leu Pro
 115 120 125
 Asp Ser Ala Asp Trp Asp Thr Thr Asn Ala Arg Gly Trp Pro Trp Val
 130 135 140
 Arg Thr Cys Arg Thr Val Asn Pro Pro Leu Val Met Gly Xaa
 145 150 155

<210> 130
 <211> 309
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (87)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (185)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (309)
 <223> Xaa equals stop translation

<400> 130
 Met Pro Val Pro Trp Phe Leu Leu Ser Leu Ala Leu Gly Arg Ser Pro
 1 5 10 15
 Val Val Leu Ser Leu Glu Arg Leu Val Gly Pro Gln Asp Ala Thr His
 20 25 30
 Cys Ser Pro Gly Leu Ser Cys Arg Leu Trp Asp Ser Asp Ile Leu Cys
 35 40 45
 Leu Pro Gly Asp Ile Val Pro Ala Pro Gly Pro Val Leu Ala Pro Thr
 50 55 60
 His Leu Gln Thr Glu Leu Val Leu Arg Cys Gln Lys Glu Thr Asp Cys
 65 70 75 80
 Asp Leu Cys Leu Arg Val Xaa Val His Leu Ala Val His Gly His Trp
 85 90 95
 Glu Glu Pro Glu Asp Glu Glu Lys Phe Gly Gly Ala Ala Asp Leu Gly
 100 105 110
 Val Glu Glu Pro Arg Asn Ala Ser Leu Gln Ala Gln Val Val Leu Ser
 115 120 125
 Phe Gln Ala Tyr Pro Thr Ala Arg Cys Val Leu Leu Glu Val Gln Val
 130 135 140
 Pro Ala Ala Leu Val Gln Phe Gly Gln Ser Val Gly Ser Val Val Tyr
 145 150 155 160
 Asp Cys Phe Glu Ala Ala Leu Gly Ser Glu Val Arg Ile Trp Ser Tyr
 165 170 175
 Thr Gln Pro Arg Tyr Glu Lys Glu Xaa Asn His Thr Gln Gln Leu Pro
 180 185 190
 Asp Cys Arg Gly Leu Glu Val Trp Asn Ser Ile Pro Ser Cys Trp Ala
 195 200 205
 Leu Pro Trp Leu Asn Val Ser Ala Asp Gly Asp Asn Val His Leu Val
 210 215 220
 Leu Asn Val Ser Glu Glu Gln His Phe Gly Leu Ser Leu Tyr Trp Asn

225				230				235				240			
Gln	Val	Gln	Gly	Pro	Pro	Lys	Pro	Arg	Trp	His	Lys	Asn	Leu	Thr	Gly
				245					250					255	
Pro	Gln	Ile	Ile	Thr	Leu	Asn	His	Thr	Asp	Leu	Val	Pro	Cys	Leu	Cys
				260					265					270	
Ile	Gln	Val	Trp	Pro	Leu	Glu	Pro	Asp	Ser	Val	Arg	Arg	Thr	Ser	Ala
				275					280					285	
Pro	Ser	Gly	Arg	Thr	Pro	Ala	His	Thr	Arg	Thr	Ser	Gly	Lys	Pro	Pro
				290					295					300	
Asp	Cys	Asp	Cys	Xaa											
305															

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<210> 131
<211> 509
<212> PRT
<213> Homo sapiens
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<220>
<221> SITE
<222> (509)
<223> Xaa equals stop translation
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<400> 131																
Met	Asp	Pro	Lys	Leu	Gly	Arg	Met	Ala	Ala	Ser	Leu	Leu	Ala	Val	Leu	
1				5					10					15		
Leu	Leu	Leu	Leu	Leu	Glu	Arg	Gly	Met	Phe	Ser	Ser	Pro	Ser	Pro	Pro	
			20					25					30			
Pro	Ala	Leu	Leu	Glu	Lys	Val	Phe	Gln	Tyr	Ile	Asp	Leu	His	Gln	Asp	
		35					40					45				
Glu	Phe	Val	Gln	Thr	Leu	Lys	Glu	Trp	Val	Ala	Ile	Glu	Ser	Asp	Ser	
	50					55					60					
Val	Gln	Pro	Val	Pro	Arg	Phe	Arg	Gln	Glu	Leu	Phe	Arg	Met	Met	Ala	
65					70					75					80	
Val	Ala	Ala	Asp	Thr	Leu	Gln	Arg	Leu	Gly	Ala	Arg	Val	Ala	Ser	Val	
			85						90					95		
Asp	Met	Gly	Pro	Gln	Gln	Leu	Pro	Asp	Gly	Gln	Ser	Leu	Pro	Ile	Pro	
			100					105					110			
Pro	Val	Ile	Leu	Ala	Glu	Leu	Gly	Ser	Asp	Pro	Thr	Lys	Gly	Thr	Val	
		115					120					125				
Cys	Phe	Tyr	Gly	His	Leu	Asp	Val	Gln	Pro	Ala	Asp	Arg	Gly	Asp	Gly	
	130					135					140					
Trp	Leu	Thr	Asp	Pro	Tyr	Val	Leu	Thr	Glu	Val	Asp	Gly	Lys	Leu	Tyr	
145					150					155					160	
Gly	Arg	Gly	Ala	Thr	Asp	Asn	Lys	Gly	Pro	Val	Leu	Ala	Trp	Ile	Asn	
				165					170					175		
Ala	Val	Ser	Ala	Phe	Arg	Ala	Leu	Glu	Gln	Asp	Leu	Pro	Val	Asn	Ile	
			180					185					190			

Lys Phe Ile Ile Glu Gly Met Glu Glu Ala Gly Ser Val Ala Leu Glu
 195 200 205
 Glu Leu Val Glu Lys Glu Lys Asp Arg Phe Phe Ser Gly Val Asp Tyr
 210 215 220
 Ile Val Ile Ser Asp Asn Leu Trp Ile Ser Gln Arg Lys Pro Ala Ile
 225 230 235 240
 Thr Tyr Gly Thr Arg Gly Asn Ser Tyr Phe Met Val Glu Val Lys Cys
 245 250 255
 Arg Asp Gln Asp Phe His Ser Gly Thr Phe Gly Gly Ile Leu His Glu
 260 265 270
 Pro Met Ala Asp Leu Val Ala Leu Leu Gly Ser Leu Val Asp Ser Ser
 275 280 285
 Gly His Ile Leu Val Pro Gly Ile Tyr Asp Glu Val Val Pro Leu Thr
 290 295 300
 Glu Glu Glu Ile Asn Thr Tyr Lys Ala Ile His Leu Asp Leu Glu Glu
 305 310 315 320
 Tyr Arg Asn Ser Ser Arg Val Glu Lys Phe Leu Phe Asp Thr Lys Glu
 325 330 335
 Glu Ile Leu Met His Leu Trp Arg Tyr Pro Ser Leu Ser Ile His Gly
 340 345 350
 Ile Glu Gly Ala Phe Asp Glu Pro Gly Thr Lys Thr Val Ile Pro Gly
 355 360 365
 Arg Val Ile Gly Lys Phe Ser Ile Arg Leu Val Pro His Met Asn Val
 370 375 380
 Ser Ala Val Glu Lys Gln Val Thr Arg His Leu Glu Asp Val Phe Ser
 385 390 395 400
 Lys Arg Asn Ser Ser Asn Lys Met Val Val Ser Met Thr Leu Gly Leu
 405 410 415
 His Pro Trp Ile Ala Asn Ile Asp Asp Thr Gln Tyr Leu Ala Ala Lys
 420 425 430
 Arg Ala Ile Arg Thr Val Phe Gly Thr Glu Pro Asp Met Ile Arg Asp
 435 440 445
 Gly Ser Thr Ile Pro Ile Ala Lys Met Phe Gln Glu Ile Val His Lys
 450 455 460
 Ser Val Val Leu Ile Pro Leu Gly Ala Val Asp Asp Gly Glu His Ser
 465 470 475 480
 Gln Asn Glu Lys Ile Asn Arg Trp Asn Tyr Ile Glu Gly Thr Lys Leu
 485 490 495
 Phe Ala Ala Phe Phe Leu Glu Met Ala Gln Leu His Xaa
 500 505

<210> 132

<211> 507

<212> PRT
 <213> Homo sapiens

 <220>
 <221> SITE
 <222> (65)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE
 <222> (112)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE
 <222> (423)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE
 <222> (425)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE
 <222> (507)
 <223> Xaa equals stop translation

 <400> 132
 Met Gly Met Arg Arg His Ser Leu Met Leu Leu Pro Trp Trp Leu Gly
 1 5 10 15
 Ala Ala Gly Arg Lys Glu Cys His Arg Glu Gln Leu Val Ala Ala Val
 20 25 30
 Glu Val Thr Glu Gln Glu Thr Lys Val Pro Lys Lys Thr Val Ile Ile
 35 40 45
 Glu Glu Thr Ile Thr Thr Val Val Lys Ser Pro Arg Gly Gln Arg Arg
 50 55 60
 Xaa Pro Ser Lys Ser Pro Ser Arg Ser Pro Ser Arg Cys Ser Ala Ser
 65 70 75 80
 Pro Leu Arg Pro Gly Leu Leu Ala Pro Asp Leu Leu Tyr Leu Pro Gly
 85 90 95
 Ala Gly Gln Pro Arg Arg Pro Glu Ala Glu Pro Gly Gln Lys Pro Xaa
 100 105 110
 Val Pro Thr Leu Tyr Val Thr Glu Ala Glu Ala His Ser Pro Ala Leu
 115 120 125
 Pro Gly Leu Ser Gly Pro Gln Pro Lys Trp Val Glu Val Glu Glu Thr
 130 135 140
 Ile Glu Val Arg Val Lys Lys Met Gly Pro Gln Gly Val Ser Pro Thr
 145 150 155 160
 Thr Glu Val Pro Arg Ser Ser Ser Gly His Leu Phe Thr Leu Pro Gly
 165 170 175
 Ala Thr Pro Gly Gly Asp Pro Asn Ser Asn Asn Ser Asn Asn Lys Leu
 180 185 190

Leu Ala Gln Glu Ala Trp Ala Gln Gly Thr Ala Met Val Gly Val Arg
 195 200 205
 Glu Pro Leu Val Phe Arg Val Asp Ala Arg Gly Ser Val Asp Trp Ala
 210 215 220
 Ala Ser Gly Met Gly Ser Leu Glu Glu Glu Gly Thr Met Glu Glu Ala
 225 230 240
 Gly Glu Glu Glu Gly Glu Asp Gly Asp Ala Phe Val Thr Glu Glu Ser
 245 250 255
 Gln Asp Thr His Ser Leu Gly Asp Arg Asp Pro Lys Ile Leu Thr His
 260 265 270
 Asn Gly Arg Met Leu Thr Leu Ala Asp Leu Glu Asp Tyr Val Pro Gly
 275 280 285
 Glu Gly Glu Thr Phe His Cys Gly Gly Pro Gly Pro Gly Ala Pro Asp
 290 295 300
 Asp Pro Pro Cys Glu Val Ser Val Ile Gln Arg Glu Ile Gly Glu Pro
 305 310 315 320
 Thr Val Gly Ser Leu Cys Cys Ser Ala Trp Gly Met His Trp Val Pro
 325 330 335
 Glu Ala Leu Ser Ala Ser Leu Gly Leu Ser Pro Val Gly Arg His His
 340 345 350
 Arg Asp Pro Arg Ser Val Ala Leu Arg Ala Pro Pro Ser Ser Cys Gly
 355 360 365
 Arg Pro Arg Leu Gly Leu Trp Ala Val Leu Pro Gly Arg Ser Leu Ser
 370 375 380
 Ala Pro Ala Ser Gly Val Leu Arg Thr Val Ala Arg Ala Ala Ser Pro
 385 390 395 400
 Gln Ser Phe Pro Pro Arg Pro Ser Thr Ser Gly Gln Trp Gly Arg Arg
 405 410 415
 Ser Pro Phe Thr Ser Val Xaa Gly Xaa Gly Pro Ser Tyr Leu Thr Gln
 420 425 430
 Leu Gln Pro Gly Gly Leu Gly Gly Ala Cys Asn Val Gly Met Thr Gly
 435 440 445
 Ser Lys Thr Ser Ala Leu Gly Cys Phe Leu Ser Ala Trp Gln Glu Pro
 450 455 460
 Gln Asp Cys Gly Arg Arg Met Trp Pro Trp Ala Phe Val Leu Phe Pro
 465 470 475 480
 His Gly Pro Gly Pro Ser Leu Leu Ala Pro Ala Thr Ala Ala Arg Pro
 485 490 495
 Asp Met Ala Leu Pro Leu Leu Gln Ser Trp Xaa
 500 505

<210> 133

<211> 49

<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (49)
<223> Xaa equals stop translation

<400> 133
Met Arg Leu Leu Leu Leu Leu Val Ala Ala Ser Ala Met Val Arg
1 5 10 15
Ser Glu Ala Ser Ala Asn Leu Gly Gly Val Pro Ser Lys Arg Leu Lys
20 25 30
Met Gln Tyr Ala Thr Gly Pro Leu Leu Lys Phe Gln Ile Cys Val Ser
35 40 45
Xaa

<210> 134
<211> 131
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (64)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (65)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (131)
<223> Xaa equals stop translation

<400> 134
Met Leu Met Pro Val His Phe Leu Leu Leu Leu Leu Leu Gly
1 5 10 15
Gly Pro Arg Thr Gly Leu Pro His Lys Phe Tyr Lys Ala Lys Pro Ile
20 25 30
Phe Ser Cys Leu Asn Thr Ala Leu Ser Glu Ala Glu Lys Gly Gln Trp
35 40 45
Glu Asp Ala Ser Leu Leu Ser Lys Arg Ser Phe His Tyr Leu Arg Xaa
50 55 60
Xaa Thr Pro Leu Arg Glu Arg Arg Arg Ala Lys Arg Lys Arg Leu
65 70 75 80
Ser Pro Ser Leu Gly Pro Gly Val Glu Pro Glu Ala Pro Gly Thr Asp
85 90 95
Thr Cys Pro Lys His Ser Pro Gly Glu Ser His Ala Arg Thr Arg Pro
100 105 110

Arg Val Pro Thr Ala Pro Ser Ser Pro Cys Pro Ser Thr Ser Pro Pro
 115 120 125

Thr Ser Xaa
 130

<210> 135
 <211> 44
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (25)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (29)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (44)
 <223> Xaa equals stop translation

<400> 135
 Met Ala Phe Leu Gln Ser Ala Ser Tyr Val Met Val Ile Leu Cys Ala
 1 5 10 15

Cys Val Ile Ile Ile Gly Ile Leu Xaa Tyr Ala Phe Xaa Phe Glu Thr
 20 25 30

Leu Ser Pro Lys Lys Arg Arg Asp Ile Glu Ile Xaa
 35 40

<210> 136
 <211> 92
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (92)
 <223> Xaa equals stop translation

<400> 136
 Met Gln Leu Ile Glu Ser Arg Phe His Phe Arg Cys Val Trp Ile Leu
 1 5 10 15

His Leu Leu Ala Leu Phe Ser Thr Trp Pro Pro Lys Asp Pro Glu Gly
 20 25 30

Ser Pro Pro Ser Ala Thr Ser Ser Pro Leu Thr Pro His Leu Ser Leu
 35 40 45

Thr Leu Pro Phe Lys Gln Ala Pro Val Ser Asn Val Ser Ser Ala Ile
 50 55 60

His Val Met Leu Asp Lys Ser Val Ser Leu Ser Glu Ile Gln Phe Ser
 65 70 75 80

His Met Pro Asn Gly Lys Arg Ala Ser Thr Leu Xaa
 85 90

<210> 137

<211> 267

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (267)

<223> Xaa equals stop translation

<400> 137

Met Glu Leu Leu Thr Ala Leu Leu Arg Leu Phe Leu Ser Arg Pro Ala
 1 5 10 15

Glu Cys Gln Asp Met Leu Gly Arg Leu Leu Tyr Tyr Cys Ile Glu Glu
 20 25 30

Glu Lys Asp Met Ala Val Arg Asp Arg Gly Leu Phe Tyr Tyr Arg Leu
 35 40 45

Leu Leu Val Gly Ile Asp Glu Val Lys Arg Ile Leu Cys Ser Pro Lys
 50 55 60

Ser Asp Pro Thr Leu Gly Leu Leu Glu Asp Pro Ala Glu Arg Pro Val
 65 70 75 80

Asn Ser Trp Ala Ser Asp Phe Asn Thr Leu Val Pro Val Tyr Gly Lys
 85 90 95

Ala His Trp Ala Thr Ile Ser Lys Cys Gln Gly Ala Glu Arg Cys Asp
 100 105 110

Pro Glu Leu Pro Lys Thr Ser Ser Phe Ala Ala Ser Gly Pro Leu Ile
 115 120 125

Pro Glu Glu Asn Lys Glu Arg Val Gln Glu Leu Pro Asp Ser Gly Ala
 130 135 140

Leu Met Leu Val Pro Asn Arg Gln Leu Thr Ala Asp Tyr Phe Glu Lys
 145 150 155 160

Thr Trp Leu Ser Leu Lys Val Ala His Gln Gln Val Leu Pro Trp Arg
 165 170 175

Gly Glu Phe His Pro Asp Thr Leu Gln Met Ala Leu Gln Val Val Asn
 180 185 190

Ile Gln Thr Ile Ala Met Ser Arg Ala Gly Ser Arg Pro Trp Lys Ala
 195 200 205

Tyr Leu Ser Ala Gln Asp Asp Thr Gly Cys Leu Phe Leu Thr Glu Leu
 210 215 220

Leu Leu Glu Pro Gly Asn Ser Glu Met Gln Ile Ser Val Lys Gln Asn
 225 230 235 240

Glu Ala Arg Thr Glu Thr Leu Asn Ser Phe Ile Ser Val Leu Glu Thr
 245 250 255

Val Ile Gly Thr Ile Glu Glu Ile Lys Ser Xaa

260

265

<210> 138

<211> 434

<212> PRT

<213> Homo sapiens

<400> 138

Met Ala Pro Glu Gly Leu Val Pro Ala Val Leu Trp Gly Leu Ser Leu
 1 5 10 15
 Phe Leu Asn Leu Pro Gly Pro Ile Trp Leu Gln Pro Ser Pro Pro Pro
 20 25 30
 Gln Ser Ser Pro Pro Pro Gln Pro His Pro Cys His Thr Cys Arg Gly
 35 40 45
 Leu Val Asp Ser Phe Asn Lys Gly Leu Glu Arg Thr Ile Arg Asp Asn
 50 55 60
 Phe Gly Gly Gly Asn Thr Ala Trp Glu Glu Glu Asn Leu Ser Lys Tyr
 65 70 75 80
 Lys Asp Ser Glu Thr Arg Leu Val Glu Val Leu Glu Gly Val Cys Ser
 85 90 95
 Lys Ser Asp Phe Glu Cys His Arg Leu Leu Glu Leu Ser Glu Glu Leu
 100 105 110
 Val Glu Ser Trp Trp Phe His Lys Gln Gln Glu Ala Pro Asp Leu Phe
 115 120 125
 Gln Trp Leu Cys Ser Asp Ser Leu Lys Leu Cys Cys Pro Ala Gly Thr
 130 135 140
 Phe Gly Pro Ser Cys Leu Pro Cys Pro Gly Gly Thr Glu Arg Pro Cys
 145 150 155 160
 Gly Gly Tyr Gly Gln Cys Glu Gly Glu Gly Thr Arg Gly Gly Ser Gly
 165 170 175
 His Cys Asp Cys Gln Ala Gly Tyr Gly Gly Glu Ala Cys Gly Gln Cys
 180 185 190
 Gly Leu Gly Tyr Phe Glu Ala Glu Arg Asn Ala Ser His Leu Val Cys
 195 200 205
 Ser Ala Cys Phe Gly Pro Cys Ala Arg Cys Ser Gly Pro Glu Glu Ser
 210 215 220
 Asn Cys Leu Gln Cys Lys Lys Gly Trp Ala Leu His His Leu Lys Cys
 225 230 235 240
 Val Asp Ile Asp Glu Cys Gly Thr Glu Gly Ala Asn Cys Gly Ala Asp
 245 250 255
 Gln Phe Cys Val Asn Thr Glu Gly Ser Tyr Glu Cys Arg Asp Cys Ala
 260 265 270
 Lys Ala Cys Leu Gly Cys Met Gly Ala Gly Pro Gly Arg Cys Lys Lys
 275 280 285
 Cys Ser Pro Gly Tyr Gln Gln Val Gly Ser Lys Cys Leu Asp Val Asp

290 295 300
 Glu Cys Glu Thr Glu Val Cys Pro Gly Glu Asn Lys Gln Cys Glu Asn
 305 310 315 320
 Thr Glu Gly Gly Tyr Arg Cys Ile Cys Ala Glu Gly Tyr Lys Gln Met
 325 330 335
 Glu Gly Ile Cys Val Lys Glu Gln Ile Pro Gly Ala Phe Pro Ile Leu
 340 345 350
 Thr Asp Leu Thr Pro Glu Thr Thr Arg Arg Trp Lys Leu Gly Ser His
 355 360 365
 Pro His Ser Thr Tyr Val Lys Met Lys Met Gln Arg Asp Glu Ala Thr
 370 375 380
 Phe Pro Gly Leu Tyr Gly Lys Gln Val Ala Lys Leu Gly Ser Gln Ser
 385 390 395 400
 Arg Gln Ser Asp Arg Gly Thr Arg Leu Ile His Val Ile Asn Ala Leu
 405 410 415
 Pro Pro Thr Cys Pro Pro Gln Lys Lys Lys Lys Lys Lys Lys Lys Gly
 420 425 430
 Gly Arg

<210> 139
 <211> 237
 <212> PRT
 <213> Homo sapiens

 <220>
 <221> SITE
 <222> (55)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE
 <222> (237)
 <223> Xaa equals stop translation

 <400> 139
 Met Ile Ser Leu Pro Gly Pro Leu Val Thr Asn Leu Leu Arg Phe Leu
 1 5 10 15
 Phe Leu Gly Leu Ser Ala Leu Ala Pro Pro Ser Arg Ala Gln Leu Gln
 20 25 30
 Leu His Leu Pro Ala Asn Arg Leu Gln Ala Val Glu Gly Gly Glu Val
 35 40 45
 Val Leu Pro Ala Trp Tyr Xaa Leu His Gly Glu Val Ser Ser Ser Gln
 50 55 60
 Pro Trp Glu Val Pro Phe Val Met Trp Phe Phe Lys Gln Lys Glu Lys
 65 70 75 80
 Glu Asp Gln Val Leu Ser Tyr Ile Asn Gly Val Thr Thr Ser Lys Pro
 85 90 95

Gly Val Ser Leu Val Tyr Ser Met Pro Ser Arg Asn Leu Ser Leu Arg
 100 105 110
 Leu Glu Gly Leu Gln Glu Lys Asp Ser Gly Pro Tyr Ser Cys Ser Val
 115 120 125
 Asn Val Gln Asp Lys Gln Gly Lys Ser Arg Gly His Ser Ile Lys Thr
 130 135 140
 Leu Glu Leu Asn Val Leu Val Pro Pro Ala Pro Pro Ser Cys Arg Leu
 145 150 155 160
 Gln Gly Val Pro His Val Gly Ala Asn Val Thr Leu Ser Cys Gln Ser
 165 170 175
 Pro Arg Ser Lys Pro Ala Val Gln Tyr Gln Trp Asp Arg Gln Leu Pro
 180 185 190
 Ser Phe Gln Thr Phe Phe Ala Pro Ala Leu Asp Val Ile Arg Gly Ser
 195 200 205
 Leu Ser Leu Thr Asn Leu Ser Ser Ser Met Ala Gly Val Tyr Val Cys
 210 215 220
 Lys Ala His Asn Glu Val Gly Thr Ala Asn Val Met Xaa
 225 230 235

<210> 140
 <211> 100
 <212> PRT
 <213> Homo sapiens
 <220>
 <221> SITE
 <222> (78)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (100)
 <223> Xaa equals stop translation

<400> 140
 Met Thr Trp Gly Thr Trp Leu Val His Thr Phe Leu Cys Ser Val Ala
 1 5 10 15
 Ser Ala Lys Thr Leu Lys Ser Val Arg Lys Tyr Leu Ser Leu Cys Ser
 20 25 30
 Pro Ile Gly Ser Ser Phe Val Val Ser Glu Gly Ser Tyr Leu Asp Ile
 35 40 45
 Ser Asp Trp Leu Asn Pro Ala Lys Leu Ser Leu Tyr Tyr Gln Ile Asn
 50 55 60
 Ala Thr Ser Pro Trp Val Arg Asp Leu Cys Gly Gln Arg Xaa Thr Asp
 65 70 75 80
 Ala Cys Glu Gln Leu Cys Asp Pro Glu Thr Gly Glu Pro Trp Glu Pro
 85 90 95
 Gly Trp Gly Xaa
 100

<210> 141
 <211> 70
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (56)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (70)
 <223> Xaa equals stop translation

<400> 141
 Met Tyr Lys Ala Phe Leu Leu Ala Leu Thr Thr Val Phe Tyr Leu Gly
 1 5 10 15
 Ile Leu Asn Ser His Phe His Gly Cys Val Leu Cys Asn Thr Asn Val
 20 25 30
 Phe Lys Trp Tyr Ser His Pro Val Gly Gln Leu Ser Lys Arg Cys Leu
 35 40 45
 Asp Ala Ser Lys Leu Ala Tyr Xaa Lys Phe Thr Ser Ile Lys Tyr Gln
 50 55 60
 Cys Asn Tyr Ser Thr Xaa
 65 70

<210> 142
 <211> 62
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (62)
 <223> Xaa equals stop translation

<400> 142
 Met His Glu Cys Gln Ser Phe Pro Leu Cys Val His Leu Arg Leu Val
 1 5 10 15
 Leu Leu Leu Ser Phe Lys Thr Gln Val His Glu Phe His Glu Val Phe
 20 25 30
 Pro His Tyr Ser His Phe Asn Phe Pro Ser Leu Asn Asn Tyr Asp Ile
 35 40 45
 Asn Leu Leu Leu Asn His Glu Leu Trp His Thr Thr Pro Xaa
 50 55 60

<210> 143
 <211> 89
 <212> PRT
 <213> Homo sapiens

<220>

<221> SITE
 <222> (73)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE
 <222> (89)
 <223> Xaa equals stop translation

 <400> 143
 Met Asn Leu Val Gly Phe Cys Leu Phe Ile Cys Leu Leu Leu Met Leu
 1 5 10 15
 Leu Leu Leu Leu Leu Phe Ser Lys Phe Ser Ile Val Glu Lys Tyr Ala
 20 25 30
 Ala Pro Glu Glu Met Ile Gly His Ser Pro Ala Trp Cys Trp Thr Leu
 35 40 45
 Ser Ser Leu Ala Gln Pro Ser Pro Asp Leu Ser Val Tyr Leu Thr Leu
 50 55 60
 Val Phe Tyr Ile Leu Gln Arg Gln Xaa Gln Asn Asn Pro Asn Leu Thr
 65 70 75 80
 Gln Ile Pro Gly Ile His Leu Ile Xaa
 85

 <210> 144
 <211> 79
 <212> PRT
 <213> Homo sapiens

 <220>
 <221> SITE
 <222> (40)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE
 <222> (46)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE
 <222> (60)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE
 <222> (79)
 <223> Xaa equals stop translation

 <400> 144
 Met Met Gly Asn Asp Leu Leu His Leu Val Phe Leu Gln Leu Ser Leu
 1 5 10 15
 Gly Val Ala Ser Gly Gly Trp Ile Leu Trp Pro Leu Arg Arg Leu Gly
 20 25 30
 Gly Ala His Thr Ser Lys Asp Xaa Asn Lys Asn Gly His Xaa Val His
 35 40 45

Cys Leu Val Ile Thr Asn Glu Pro Leu Val Ser Xaa Lys Lys Ile Gly
 50 55 60

Leu Ser Ser Pro His Thr Cys Pro Ser Thr Leu Gln Gln Phe Xaa
 65 70 75

<210> 145

<211> 91

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (91)

<223> Xaa equals stop translation

<400> 145

Met Met Val Trp Asn Leu Phe Pro Cys Phe Pro Pro Leu Leu Leu Leu
 1 5 10 15

Gln Phe Ile Asp Cys Gln Gln Ser Ser Glu Ile Glu Gln Gly Phe Thr
 20 25 30

Arg Ser Leu Leu Gly His Pro Ile Phe Phe Cys Pro Asp Pro Cys Trp
 35 40 45

Gln Ser Cys Met Asn Cys Val Ile Leu Leu Ser Ala Phe Phe Phe Leu
 50 55 60

Phe Asp Lys Met Asp Ile Lys Asn Ser Cys Cys Ala Lys Val Ser Ser
 65 70 75 80

Leu Leu Gln Glu Glu Asn Gln Phe Phe Phe Xaa
 85 90

<210> 146

<211> 69

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (69)

<223> Xaa equals stop translation

<400> 146

Met Tyr Leu Gly Ser Arg Ile Val Lys Ala Leu Phe Phe Leu Leu Phe
 1 5 10 15

Cys Ile Phe His Ile Trp Tyr Asn Glu His Val Leu Arg Thr Val Leu
 20 25 30

Asp Leu Arg Lys Tyr Ala Asn Thr Val Gln Ile Val Leu Ala Ser Pro
 35 40 45

Met Pro Ser Ser Ser Ile Ala Asn Val Ser Thr Leu Val Trp Cys Val
 50 55 60

Cys Cys Asn Gly Xaa
 65

<210> 147
<211> 44
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (44)
<223> Xaa equals stop translation

<400> 147
Met Lys Cys Thr Glu Lys Cys Val Val Val Phe Phe Thr Phe Val Leu
1 5 10 15
Tyr Met Tyr Val Tyr Trp Val Leu Trp Ala Val Glu Ala Lys Leu Thr
20 25 30
Ser His Val Ala His Glu Met Leu Val Ser Cys Xaa
35 40

<210> 148
<211> 85
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (71)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (85)
<223> Xaa equals stop translation

<400> 148
Met Gly Cys Ile Pro Leu Ile Lys Ser Ile Ser Asp Trp Arg Val Ile
1 5 10 15
Ala Leu Ala Ala Leu Trp Phe Cys Leu Ile Gly Leu Ile Cys Gln Ala
20 25 30
Leu Cys Ser Glu Asp Gly His Lys Arg Arg Ile Leu Thr Leu Gly Leu
35 40 45
Gly Phe Leu Val Ile Pro Phe Leu Pro Ala Ser Asn Leu Phe Phe Arg
50 55 60
Val Gly Phe Val Val Ala Xaa Cys Ser Ser Thr Ser Pro Ala Leu Gly
65 70 75 80
Thr Val Cys Cys Xaa
85

<210> 149
<211> 64
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (64)

<223> Xaa equals stop translation

<400> 149

```
Met Phe Ile Leu Leu Ile Val Phe Val Phe Ser Lys Ser Lys Gln Val
 1           5           10           15
Leu Ser Ile Cys Leu Lys Ile Phe Lys Val Glu Ile Asn Ser Ile Ser
          20           25           30
Phe Cys Lys Asn Lys Lys Tyr Lys Asp Leu Pro Tyr Ala Phe Ala Ser
          35           40           45
Glu Lys Thr Gly Arg Thr Tyr Ser Asn Val Asn Asn Asp Tyr Leu Xaa
 50           55           60
```

<210> 150

<211> 62

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (62)

<223> Xaa equals stop translation

<400> 150

```
Met Ile Val Tyr Trp Met Ile Trp Ala Leu Arg Ser Pro Leu Thr Thr
 1           5           10           15
Ala Gln Asn Ile His Ser Ser Thr Ala Leu Thr Glu Phe Ala Lys Cys
          20           25           30
Ile Lys Glu Val Thr Trp Arg Val Arg Ser Tyr Glu Thr Ile Cys Arg
          35           40           45
Lys Trp Gly Lys Lys Gly His Met Ala Gln Leu Lys Leu Xaa
 50           55           60
```

<210> 151

<211> 83

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (83)

<223> Xaa equals stop translation

<400> 151

```
Met Arg Phe Phe Leu Glu Cys Val Leu Leu Ile Cys Phe Arg Ala Met
 1           5           10           15
Ser Ala Ile Tyr Thr His Thr Ser Ile Gly Asn Ala Gln Lys Leu Phe
          20           25           30
Thr Asp Gly Ser Ala Phe Arg Arg Val Arg Glu Pro Leu Pro Lys Glu
          35           40           45
Gly Lys Ser Trp Pro Gln Leu Glu Gln Ala Cys Leu Gly Pro Cys Ser
```

50 55 60
 Val Phe Gln Leu Gln Thr Ala Cys Ile Ile Pro Ser Cys Tyr Ser Ser
 65 70 75 80
 Phe Thr Xaa

<210> 152
 <211> 47
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (47)
 <223> Xaa equals stop translation

<400> 152
 Met Cys Cys Ala Ser His Pro Cys Gln Arg Glu Gly Trp Leu Cys Val
 1 5 10 15
 Ile Phe Thr Val Phe Leu Lys Val Thr Val Cys Val Phe Thr Phe Val
 20 25 30
 Gln Ile Thr Gly Ser Lys Ala Ala Asn Ser Ala Ile Thr Cys Xaa
 35 40 45

<210> 153
 <211> 188
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (188)
 <223> Xaa equals stop translation

<400> 153
 Met Ala Cys Lys Gly Leu Leu Gln Gln Val Gln Gly Pro Arg Leu Pro
 1 5 10 15
 Trp Thr Arg Leu Leu Leu Leu Leu Val Phe Ala Val Gly Phe Leu
 20 25 30
 Cys His Asp Leu Pro Val Thr Gln Leu Leu Pro Gly Trp Leu Gly Glu
 35 40 45
 Thr Leu Pro Leu Trp Gly Ser His Leu Leu Thr Val Val Arg Pro Ser
 50 55 60
 Leu Gln Leu Ala Trp Ala His Thr Asn Ala Thr Val Ser Phe Leu Ser
 65 70 75 80
 Ala His Cys Ala Ser His Leu Ala Trp Phe Gly Asp Ser Leu Thr Ser
 85 90 95
 Leu Ser Gln Arg Leu Gln Ile Gln Leu Pro Asp Ser Val Asn Gln Leu
 100 105 110
 Leu Arg Tyr Leu Arg Glu Leu Pro Leu Leu Phe His Gln Asn Val Leu
 115 120 125

Leu Pro Leu Trp His Leu Leu Leu Glu Ala Leu Ala Trp Ala Gln Glu
 130 135 140
 His Cys His Glu Ala Cys Arg Gly Glu Val Thr Trp Asp Cys Met Lys
 145 150 155 160
 Thr Gln Leu Ser Glu Ala Val His Trp Thr Trp Leu Cys Tyr Arg Thr
 165 170 175
 Leu Gln Trp Leu Ser Trp Thr Gly His Leu Pro Xaa
 180 185

<210> 154
 <211> 114
 <212> PRT
 <213> Homo sapiens
 <220>
 <221> SITE
 <222> (114)
 <223> Xaa equals stop translation

<400> 154
 Met Ile Phe Ser Met Pro Gln Gln Gly Ser Ser Trp Phe Leu Ser Ala
 1 5 10 15
 Phe Leu Ser Trp Pro Leu Ala Leu Ala Pro Ala Leu Thr Pro Thr Pro
 20 25 30
 Ala Pro Ala Arg Ala Pro Gly Ala Pro Arg Ala Ala Gly Ala Pro Gly
 35 40 45
 Arg Val Ala Ala Gly Arg Gly Thr Cys Ala Gly Ala Leu Ala Pro Gly
 50 55 60
 Gln Glu Ala Trp Ser Ala Val Trp Glu Pro Gly Leu Phe Ile Trp Val
 65 70 75 80
 Glu His Pro Leu Gly Cys Gln Gly His Gly Leu Asp Arg Phe Pro Leu
 85 90 95
 Pro Thr Ala Leu Pro Leu Gln Gly Gly His Ala Ala Cys Cys Pro Gln
 100 105 110
 Leu Xaa

<210> 155
 <211> 293
 <212> PRT
 <213> Homo sapiens
 <220>
 <221> SITE
 <222> (293)
 <223> Xaa equals stop translation

<400> 155
 Met Gly Ile Gln Thr Ser Pro Val Leu Leu Ala Ser Leu Gly Val Gly
 1 5 10 15

Leu Val Thr Leu Leu Gly Leu Ala Val Gly Ser Tyr Leu Val Arg Arg
 20 25 30
 Ser Arg Arg Pro Gln Val Thr Leu Leu Asp Pro Asn Glu Lys Tyr Leu
 35 40 45
 Leu Arg Leu Leu Asp Lys Thr Thr Val Ser His His Thr Leu Gly Leu
 50 55 60
 Pro Val Gly Lys His Ile Tyr Leu Ser Thr Arg Ile Asp Gly Ser Leu
 65 70 75 80
 Val Ile Arg Pro Tyr Thr Pro Val Thr Ser Asp Glu Asp Gln Gly Tyr
 85 90 95
 Val Asp Leu Val Ile Lys Val Tyr Leu Lys Gly Val His Pro Lys Phe
 100 105 110
 Pro Glu Gly Gly Lys Met Ser Gln Tyr Leu Asp Ser Leu Lys Val Gly
 115 120 125
 Asp Val Val Glu Phe Arg Gly Pro Ser Gly Leu Leu Thr Tyr Thr Gly
 130 135 140
 Lys Gly His Phe Asn Ile Gln Pro Asn Lys Lys Ser Pro Pro Glu Pro
 145 150 155 160
 Arg Val Ala Lys Lys Leu Gly Met Ile Ala Gly Gly Thr Gly Ile Thr
 165 170 175
 Pro Met Leu Gln Leu Ile Arg Ala Ile Leu Lys Val Pro Glu Asp Pro
 180 185 190
 Thr Gln Cys Phe Leu Leu Phe Ala Asn Gln Thr Glu Lys Asp Ile Ile
 195 200 205
 Leu Arg Glu Asp Leu Glu Glu Leu Gln Ala Arg Tyr Pro Asn Arg Phe
 210 215 220
 Lys Leu Trp Phe Thr Leu Asp His Pro Pro Lys Asp Trp Ala Tyr Ser
 225 230 235 240
 Lys Gly Phe Val Thr Ala Asp Met Ile Arg Glu His Leu Pro Ala Pro
 245 250 255
 Gly Asp Asp Val Leu Val Leu Leu Cys Gly Pro Pro Pro Met Val Gln
 260 265 270
 Leu Ala Cys His Pro Asn Leu Asp Lys Leu Gly Tyr Ser Gln Lys Met
 275 280 285
 Arg Phe Thr Tyr Xaa
 290

<210> 156

<211> 87

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (87)

<223> Xaa equals stop translation

<400> 156
 Met Val Met Val Phe Phe Leu Thr Phe Ser Gly Ser His Gly Cys Val
 1 5 10 15
 Pro Thr Ser Gln Pro Trp Lys Asp Ala Glu Asp Gln Val Gly Cys Val
 20 25 30
 His Ala Val Ala Trp Val Asn Ser Ala Leu Tyr Thr Val Leu Cys Pro
 35 40 45
 Phe Leu Gly Lys Pro Lys Cys Ser Phe Ser Phe Asp Arg Asn Glu Ser
 50 55 60
 Glu Asp Leu Asn Lys Gln Glu Val Lys Cys Arg Ala Val Pro Val Ser
 65 70 75 80
 Val Ser Ser Ser Met Leu Xaa
 85

<210> 157
 <211> 107
 <212> PRT
 <213> Homo sapiens
 <220>
 <221> SITE
 <222> (107)
 <223> Xaa equals stop translation

<400> 157
 Met Leu Ala Thr Met Val Val Gln Ile Leu Arg Leu Arg Pro His Thr
 1 5 10 15
 Gln Lys Trp Ser His Val Leu Thr Leu Leu Gly Leu Ser Leu Val Leu
 20 25 30
 Gly Leu Pro Trp Ala Leu Ile Phe Phe Ser Phe Ala Ser Gly Thr Phe
 35 40 45
 Gln Leu Val Val Leu Tyr Leu Phe Ser Ile Ile Thr Ser Phe Gln Gly
 50 55 60
 Phe Leu Ile Phe Ile Trp Tyr Trp Ser Met Arg Leu Gln Ala Arg Gly
 65 70 75 80
 Gly Pro Ser Pro Leu Lys Ser Asn Ser Asp Ser Ala Arg Leu Pro Ile
 85 90 95
 Ser Ser Gly Ser Thr Ser Ser Ser Arg Ile Xaa
 100 105

<210> 158
 <211> 59
 <212> PRT
 <213> Homo sapiens
 <220>
 <221> SITE
 <222> (59)
 <223> Xaa equals stop translation

100

<400> 158

Met Ala Trp Arg Val Trp Cys Leu Trp Gly Ile Pro Pro Leu Phe Cys
1 5 10 15

Ser Pro Gly Thr Leu Ser Cys Val Cys Val Ser Phe Leu Ser Pro Gly
20 25 30

Asn Gly Met Ala Ser Glu His His Pro Arg Ser Ile Phe Pro Leu Gln
35 40 45

Asn Asp Val Ser Ser His Val Cys Phe Cys Xaa
50 55

<210> 159

<211> 41

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (41)

<223> Xaa equals stop translation

<400> 159

Met Arg Ser Asp Cys Val Leu Ile Trp Gln Leu Val Gly Val Leu Leu
1 5 10 15

Ala Ser Gly Leu Ser Gly Asp Arg Ala Pro Leu Ile Val Leu Thr Ala
20 25 30

Cys Asp Lys Ala Trp Ala Thr Val Xaa
35 40

<210> 160

<211> 66

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (29)

<223> Xaa equals any of the naturally occurring L-amino acids

<220>

<221> SITE

<222> (35)

<223> Xaa equals any of the naturally occurring L-amino acids

<220>

<221> SITE

<222> (63)

<223> Xaa equals any of the naturally occurring L-amino acids

<220>

<221> SITE

<222> (64)

<223> Xaa equals any of the naturally occurring L-amino acids

<220>

<221> SITE

<222> (66)

<223> Xaa equals stop translation

<400> 160
 Met Trp Ala Cys Trp Gly Met Leu Gly Cys Ile Pro Leu Phe Val Pro
 1 5 10 15
 Trp Val Pro Val Leu Gly Lys His Phe Ser Gly Cys Xaa Tyr Leu Cys
 20 25 30
 Gly Arg Xaa Pro Cys Trp Ile Ala Phe Ile Cys Val Arg Thr Pro Cys
 35 40 45
 Gly Pro Thr Thr Ala Pro Thr Ala Thr Leu Lys Trp Ser Pro Xaa Xaa
 50 55 60
 Thr Xaa
 65

<210> 161
 <211> 47
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (47)
 <223> Xaa equals stop translation

<400> 161
 Met Arg Tyr Trp Thr Asp Met Arg Arg Asn Tyr Arg Val Thr Tyr Gln
 1 5 10 15
 Val Val Leu Leu Phe Leu Cys Phe Ser Leu Leu Thr Glu Cys Lys Thr
 20 25 30
 Phe Glu Pro Arg Ser Glu Arg Ser Leu Phe Ser Tyr Pro Leu Xaa
 35 40 45

<210> 162
 <211> 141
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (141)
 <223> Xaa equals stop translation

<400> 162
 Met Phe Ala Gly Leu Phe Phe Leu Phe Phe Val Arg Phe Gly Ile Gly
 1 5 10 15
 Arg Gln Leu Leu Ile Lys Phe Pro Trp Phe Phe Ser Phe Gly Tyr Phe
 20 25 30
 Ser Lys Gln Gly Pro Thr Gln Lys Gln Ile Asp Ala Ala Ser Phe Thr
 35 40 45
 Leu Thr Phe Phe Gly Gln Gly Tyr Ser Gln Gly Thr Gly Thr Asp Lys
 50 55 60
 Asn Lys Pro Asn Ile Lys Ile Cys Thr Gln Val Lys Gly Pro Glu Ala
 65 70 75 80

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<210> 164
<211> 168
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (168)
<223> Xaa equals stop translation

<400> 164
Met Cys Gly Phe Leu Ser Leu Gln Ile Met Gly Pro Leu Ile Val Leu
  1                      5                      10                      15

Val Gly Leu Cys Phe Phe Val Val Ala His Val Lys Lys Arg Asn Thr
                20                      25                      30

Leu Asn Ala Gly Gln Asp Ala Ser Glu Arg Glu Glu Gly Gln Ile Gln
  35                      40                      45

Ile Met Glu Pro Val Gln Val Thr Val Gly Asp Ser Val Ile Ile Phe
  50                      55                      60

Pro Pro Pro Pro Pro Tyr Phe Pro Glu Ser Ser Ala Ser Ala Val
  65                      70                      75                      80

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103

Ala Glu Ser Pro Gly Thr Asn Ser Leu Leu Pro Asn Glu Asn Pro Pro
 85 90 95

Ser Tyr Tyr Ser Ile Phe Asn Tyr Gly Thr Pro Thr Ser Glu Gly Ala
 100 105 110

Ala Ser Glu Arg Asp Cys Glu Ser Ile Tyr Thr Ile Ser Gly Thr Asn
 115 120 125

Ser Ser Ser Glu Ala Ser His Thr Pro His Leu Pro Ser Glu Leu Pro
 130 135 140

Pro Arg Tyr Glu Glu Lys Glu Asn Ala Ala Ala Thr Phe Leu Pro Leu
 145 150 155 160

Ser Ser Glu Pro Ser Pro Pro Xaa
 165

<210> 165
 <211> 63
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (63)
 <223> Xaa equals stop translation

<400> 165
 Met Ser Ile Ser Leu Ser Ser Leu Ile Leu Leu Pro Ile Trp Ile Asn
 1 5 10 15

Met Ala Gln Ile Gln Gln Gly Gly Pro Asp Glu Lys Glu Lys Thr Thr
 20 25 30

Ala Leu Lys Asp Leu Leu Ser Arg Ile Asp Leu Asp Glu Leu Met Lys
 35 40 45

Lys Asp Glu Pro Pro Leu Asp Phe Leu Ile Pro Trp Lys Val Xaa
 50 55 60

<210> 166
 <211> 114
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (114)
 <223> Xaa equals stop translation

<400> 166
 Met His Pro Pro Leu Thr Pro Pro Thr Pro Leu Cys Leu Trp Leu Arg
 1 5 10 15

Leu Leu Lys Ala Gln Ile Leu Ser Tyr Pro Val Pro Arg Phe Glu Thr
 20 25 30

His Ser Leu Ile Ser Arg Cys Ser Gln Val Pro Pro Thr Phe Leu Trp
 35 40 45

Asp Ile Lys Lys Gly Val Arg Gly Gln Arg Glu Pro Ser Gly Pro Leu

104

50 55 60
 Leu Pro Tyr Thr Leu His Cys Pro Phe Ser Pro His Gln Asn Ala Gln
 65 70 75 80
 Arg Arg Cys Asp Asp Ala Thr Glu Asp Tyr Ala Thr Trp Ser Asn Arg
 85 90 95
 Ser Gly Gln His Asp Gln Leu Ser Arg Gly Cys Leu Leu Pro Phe Leu
 100 105 110
 Leu Xaa

<210> 167
 <211> 62
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (37)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (39)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (62)
 <223> Xaa equals stop translation

<400> 167
 Met Gly Arg Leu Gly Leu Cys Leu Leu Arg Ser Leu Trp Val Pro Gln
 1 5 10 15
 Arg Arg Ala Thr Thr Leu Gly Trp Thr Leu Ala Leu Arg Val Leu Pro
 20 25 30
 Thr Ala Arg Ala Xaa Arg Xaa Leu Pro Val Ala Ala Asp Thr Ala Arg
 35 40 45
 Arg Ala Cys Gly Ala His Thr Arg Ile Arg Val Leu Gly Xaa
 50 55 60

<210> 168
 <211> 42
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (41)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (42)
 <223> Xaa equals stop translation

<400> 168
Met Asp Ile Asn Phe Cys Leu Arg Gly Arg His Gly Val Leu Phe Cys
1 5 10 15
Phe Val Leu Phe Cys Phe Cys His Leu Leu Thr Val Leu Ser Thr His
20 25 30
Arg Ala Phe Tyr Tyr Leu Ser Ala Xaa Xaa
35 40

<210> 169
<211> 43
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (43)
<223> Xaa equals stop translation

<400> 169
Met Ile Lys Leu Gln Lys Val Ser Glu Val Ile Lys Val Leu Lys Met
1 5 10 15
Leu Leu Tyr Pro Leu Val Leu Leu Ser Leu Lys Leu Asp Thr Lys
20 25 30
Ala Thr Ile Phe Ala Val Leu Glu Asp Val Xaa
35 40

<210> 170
<211> 48
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (48)
<223> Xaa equals stop translation

<400> 170
Met Tyr Phe Phe Thr Phe Tyr Phe Ser Ile Ser Ser Phe Met Phe Phe
1 5 10 15
Leu Leu Val Ile Val Lys Ala Thr Asn Gly Pro Arg Tyr Val Val Gly
20 25 30
Cys Arg Arg Gln Val Ile Leu Tyr Ile Cys Ile Val Pro Asp Asp Xaa
35 40 45

<210> 171
<211> 51
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (51)

<223> Xaa equals stop translation

<400> 171

Met Ser Gly Phe Lys Glu Phe Asp Phe Val Val Pro Trp Trp Ser Ile
1 5 10 15

Ser Phe Leu Leu Ser Phe Leu Leu Leu Leu Ser Phe Trp Ser Leu
20 25 30

Trp Val Tyr Thr Phe His Gln Ile Trp Asn Ile Phe Gly Tyr Tyr Phe
35 40 45

Ser Lys Xaa
50

<210> 172

<211> 57

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (57)

<223> Xaa equals stop translation

<400> 172

Met Cys Ile Ser Gly Cys Leu Phe His Cys Ser Ile Cys Leu Phe Phe
1 5 10 15

Met Leu Val Pro Tyr Cys Phe Asp Tyr Cys Leu Val Met Tyr Phe Glu
20 25 30

Ile Lys Thr Cys Gly Tyr Leu Leu Leu Cys Ser Pro Cys Gln Asp Tyr
35 40 45

Ser Arg Ser Phe Val Ala Ser Ser Xaa
50 55

<210> 173

<211> 170

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (163)

<223> Xaa equals any of the naturally occurring L-amino acids

<400> 173

Met Ala Ala Gly Pro Gly Thr His Leu Ser Leu Phe Trp Ala Arg Ile
1 5 10 15

Ala Thr Leu Ala Val Trp Ala Ala Ala Leu Val Thr Val Pro Thr
20 25 30

Ala Val Phe Gly Val Glu Gly Glu Val Cys Gly Val Arg Leu Cys Leu
35 40 45

Leu Arg Phe Pro Ser Arg Tyr Trp Leu Gly Ala Tyr Gln Leu Gln Arg
50 55 60

Val Val Leu Ala Phe Met Val Pro Leu Gly Val Ile Thr Thr Ser Tyr

107

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65              70              75              80
Leu Leu Leu Leu Ala Phe Leu Gln Arg Arg Gln Arg Arg Arg Gln Asp
      85              90              95
Ser Arg Val Val Ala Arg Ser Val Arg Ile Leu Val Ala Ser Phe Phe
      100              105              110
Leu Cys Trp Phe Pro Asn His Val Val Thr Leu Trp Gly Val Leu Val
      115              120              125
Lys Phe Asp Leu Val Pro Trp Asn Ser Thr Phe Tyr Thr Ile Gln Thr
      130              135              140
Tyr Val Phe Pro Val Thr Thr Cys Leu Ala His Ser Asn Ser Cys Leu
      145              150              155              160
Asn Pro Xaa Ala Tyr Val Leu Ser Arg Ile
      165              170

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<210> 174
<211> 45
<212> PRT
<213> Homo sapiens

```

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<220>
<221> SITE
<222> (45)
<223> Xaa equals stop translation

```

```

<400> 174
Met Phe Arg Ser Ser Ile Ser Leu Met Val Phe Ser Leu Ile Leu Leu
  1              5              10              15
Leu Thr Thr Glu Arg Arg Ile Leu Ala Cys Pro Pro Ile Ile Leu Asn
      20              25              30
Ser Ser Ile Phe Leu Ser Asp Leu Ser Val Leu Pro Xaa
      35              40              45

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<210> 175
<211> 47
<212> PRT
<213> Homo sapiens

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<220>
<221> SITE
<222> (47)
<223> Xaa equals stop translation

```

```

<400> 175
Met Asn Pro Leu Ser Phe Leu Phe Cys Phe Ile Ile Cys Arg Leu Leu
  1              5              10              15
Ala Glu Asn Ala Ile Asn Ile Glu Ile Leu Thr Gly Thr Tyr Glu Asn
      20              25              30
Phe Pro Thr Lys Ala Tyr Tyr Phe Arg Gln Arg Ser Arg Lys Xaa
      35              40              45

```

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<210> 176

```

<211> 42
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (42)
 <223> Xaa equals stop translation

<400> 176
 Met Ala Ser Leu Leu Arg Thr Cys Cys Val Pro Tyr Ile Val Leu Ser
 1 5 10 15
 Ile Tyr Leu Asp Tyr Leu Ile Lys Ser Ser Gln Ser Leu Tyr Leu Thr
 20 25 30
 Asp Gly Glu Ile Lys Ala His Gly Thr Xaa
 35 40

<210> 177
 <211> 48
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (48)
 <223> Xaa equals stop translation

<400> 177
 Met Leu Gln Asp Leu Leu Ser Ala Leu Trp Phe Cys His Pro Cys Cys
 1 5 10 15
 Leu Cys Cys Gly Leu Cys Trp Leu Gly Val Asp Ala Gly Cys Ser Gln
 20 25 30
 Gly Gly Ser Gly Cys Pro Gln Gly Lys Ile Ser Asn Asn Gly Ile Xaa
 35 40 45

<210> 178
 <211> 71
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (71)
 <223> Xaa equals stop translation

<400> 178
 Met Lys Phe Ala Pro Val Tyr Met Tyr Leu Ser Phe Ile Cys Leu Cys
 1 5 10 15
 Leu Phe Tyr Cys Asn Ser Ile Asp Thr His His Cys Phe Val Ser Asp
 20 25 30
 Tyr Leu Ala Phe Glu Ser Ser Met Arg Glu Ala Phe Thr Glu Leu Leu
 35 40 45

Ile Leu Ile Lys Gly Glu Ser Asn Val Leu Lys Lys Met Gln Asn His
 50 55 60

His Leu Cys Gln Ser Tyr Xaa
 65 70

<210> 179
 <211> 42
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (42)
 <223> Xaa equals stop translation

<400> 179
 Met Gly Leu Lys Leu Pro Ile Phe Leu Trp Phe Leu Tyr Phe Phe Ile
 1 5 10 15

Pro Leu Ser Ser Cys Tyr Leu Leu Leu Leu Pro His Leu Pro Ser Gly
 20 25 30

Ser Trp Asp Ser Met Leu Ser Phe Pro Xaa
 35 40

<210> 180
 <211> 92
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (18)
 <223> Xaa equals any of the naturally occurring L-amino acids

<400> 180
 Met Ala Gly Cys Leu Gly Ser Tyr Leu Leu Val Met Ile Leu Ile Leu
 1 5 10 15

Cys Xaa Ala His Phe Phe Ile Cys Gly Asn Glu Asp Asn Arg Val Leu
 20 25 30

Arg Tyr Asn Leu Glu Gln Cys Pro Ser His Ser Lys His Val Ile Asn
 35 40 45

Gly Ser Ser Tyr Cys Tyr Tyr Tyr Tyr Tyr Tyr Tyr Leu Glu Asp Arg
 50 55 60

Gly Ser Val Leu Phe Ile Ile Pro Ser Pro Ala Leu Ser Thr Val Pro
 65 70 75 80

Gly Thr Ile Gln Thr Cys Ile Trp Met Asn Asp Lys
 85 90

<210> 181
 <211> 72
 <212> PRT
 <213> Homo sapiens

<220>

<221> SITE
 <222> (72)
 <223> Xaa equals stop translation

 <400> 181
 Met Pro Ala Gly Val Pro Met Ser Thr Tyr Leu Lys Met Phe Ala Ala
 1 5 10 15
 Ser Leu Leu Ala Met Cys Ala Gly Ala Glu Val Val His Arg Tyr Tyr
 20 25 30
 Arg Pro Asp Leu Thr Ile Pro Glu Ile Pro Pro Lys Arg Gly Glu Leu
 35 40 45
 Lys Thr Glu Leu Leu Gly Leu Lys Glu Arg Lys His Lys Pro Gln Val
 50 55 60
 Ser Gln Gln Glu Glu Leu Lys Xaa
 65 70

 <210> 182
 <211> 67
 <212> PRT
 <213> Homo sapiens

 <220>
 <221> SITE
 <222> (23)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE
 <222> (45)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE
 <222> (67)
 <223> Xaa equals stop translation

 <400> 182
 Met Ala Gly Phe Ala Ser Tyr Pro Trp Ser Asp Phe Pro Trp Cys Trp
 1 5 10 15
 Val Val Cys Phe Ser Phe Xaa Phe Phe Phe Leu Arg Gln Ser Glu Ser
 20 25 30
 Leu Ser Gln Lys Lys Arg Gln Val Ala Asp Glu Leu Xaa Phe Gly Gln
 35 40 45
 Ser Lys Arg Asp Ser Asp Gly Gly Trp Met Leu Arg Ser Ser Ala Gly
 50 55 60
 Asn Ser Xaa
 65

 <210> 183
 <211> 71
 <212> PRT
 <213> Homo sapiens

 <220>

<221> SITE
 <222> (14)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE
 <222> (21)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE
 <222> (71)
 <223> Xaa equals stop translation

 <400> 183
 Met Gln Pro Ser Tyr Pro Leu Ser Trp Ser Gly Gly Val Xaa Leu Pro
 1 5 10 15

 Cys Leu Ala Ser Xaa Leu Thr Leu Leu Phe Leu Leu Gln Pro Leu Met
 20 25 30

 Leu Pro Leu Gly Gly Ser Gln Thr Gln Leu Gly Asn His Ser Val Val
 35 40 45

 Arg Leu Leu Leu Pro Val Gln Arg Leu Gly Phe Ala Glu Val Pro Pro
 50 55 60

 Leu Glu Val Ala Gln Ser Xaa
 65 70

 <210> 184
 <211> 41
 <212> PRT
 <213> Homo sapiens

 <220>
 <221> SITE
 <222> (41)
 <223> Xaa equals stop translation

 <400> 184
 Met Ile Pro Leu Arg Arg Gly Met Val Gly Gly Leu Leu Leu Leu
 1 5 10 15

 Ala Thr Ala Asn Lys Leu Leu Ala Ala Ser Phe Arg Asp Leu Met Asp
 20 25 30

 Val Leu Thr Cys Pro Arg Pro Arg Xaa
 35 40

 <210> 185
 <211> 67
 <212> PRT
 <213> Homo sapiens

 <220>
 <221> SITE
 <222> (36)
 <223> Xaa equals any of the naturally occurring L-amino acids

 <220>
 <221> SITE

<222> (67)

<223> Xaa equals stop translation

<400> 185

Met	Gln	His	Leu	Leu	Leu	His	Ser	Leu	Cys	Leu	Ser	Cys	Ser	Thr	Met
1				5					10					15	

Ala	Arg	Asn	Val	Pro	Ala	Ser	Pro	Ser	Pro	Ser	Ala	Val	Ile	Val	Ser
			20				25						30		

Phe	Leu	Arg	Xaa	Pro	Gln	Pro	Cys	Phe	Leu	Tyr	Ser	Leu	Gln	Asn	Cys
		35					40					45			

Glu	Ser	Ile	Lys	Pro	Leu	Phe	Phe	Ile	Asn	Ser	Pro	Val	Ser	Ser	Ser
	50					55					60				

Ser	Leu	Xaa
65		

<210> 186

<211> 67

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (67)

<223> Xaa equals stop translation

<400> 186

Met	Leu	Pro	Ser	Trp	Trp	Ala	Leu	Gly	Trp	Met	Thr	Leu	Lys	Ile	Leu
1				5					10					15	

Gln	Met	Trp	Val	Gln	Ala	Cys	Thr	His	Thr	Met	Glu	Tyr	Gly	His	Ser
			20					25					30		

Tyr	Thr	Gly	Gly	Val	Glu	Ser	Gly	Ser	Ala	Ala	Trp	His	Leu	Thr	Glu
		35					40					45			

Val	Gly	Pro	Lys	Arg	Thr	His	Asp	Tyr	Ala	Glu	Asn	Trp	Ile	Gly	Ser
	50					55					60				

Leu	Ser	Xaa
65		

<210> 187

<211> 49

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (49)

<223> Xaa equals stop translation

<400> 187

Met	His	Phe	Ser	Val	Ala	His	Ser	Ile	Trp	Gly	Ile	Leu	Ile	Leu	Leu
1				5					10					15	

Ser	Leu	Tyr	Glu	Gly	Val	Ile	Ser	Trp	Val	Phe	Asn	Phe	Gln	Met	Phe
			20					25					30		

Thr Lys Leu Leu Leu Cys Ala Lys His Tyr Ser His Cys Phe Glu Ser
 35 40 45

Xaa

<210> 188
 <211> 67
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (67)
 <223> Xaa equals stop translation

<400> 188
 Met Ser Leu Ile Leu Gly Ser Pro Ile Ile Pro Leu Trp Ser Tyr
 1 5 10 15
 Thr Ser Ala Thr Gln Ala Ala Ala Leu Val Thr Ser His Val Trp Lys
 20 25 30
 Pro Ser Leu Glu Ala His Gln Ile Asn Ile Ser Pro Glu Pro Ser Ile
 35 40 45
 His Tyr Asp Arg Trp His Thr Gln Ser Asn Cys Ser Leu Ile Asn Ser
 50 55 60
 Leu Gln Xaa
 65

<210> 189
 <211> 58
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (58)
 <223> Xaa equals stop translation

<400> 189
 Met Lys Gln Thr Tyr Trp Gln Thr His Ile Leu Leu Val Leu Thr Leu
 1 5 10 15
 Tyr Phe Ile Val Leu Ala Tyr Ser Pro Phe Leu Arg Phe Leu Leu Arg
 20 25 30
 Asn Ile Gly Thr His Pro Leu Leu Cys Ala Glu Gly Ile Thr Ser Phe
 35 40 45
 Phe Leu Ser Tyr Lys Asn Met Leu Tyr Xaa
 50 55

<210> 190
 <211> 53
 <212> PRT
 <213> Homo sapiens

<220>

<221> SITE
 <222> (53)
 <223> Xaa equals stop translation

 <400> 190
 Met Gly Pro Asn Phe Val Val Leu Cys Leu Asn Leu Leu Gln Asp Thr
 1 5 10 15
 Leu Ala Tyr Ala Thr Ala Leu Leu Asn Glu Lys Glu Gln Ser Gly Ser
 20 25 30
 Ser Asn Gly Ser Glu Ser Ser Pro Ala Asn Glu Asn Gly Asp Arg His
 35 40 45
 Leu Gln Gln Val Xaa
 50

 <210> 191
 <211> 44
 <212> PRT
 <213> Homo sapiens

 <220>
 <221> SITE
 <222> (44)
 <223> Xaa equals stop translation

 <400> 191
 Met Ile Val Ile Ala Val Ser Leu Ser Leu Phe Cys Asp Val Val Ser
 1 5 10 15
 Ser Glu Cys Met Ser Cys Phe Thr Pro Lys Phe Ala Asp Ile Val Ala
 20 25 30
 Asn Ala Tyr Gln Asn Glu Ser Tyr Ile Phe Ile Xaa
 35 40

 <210> 192
 <211> 53
 <212> PRT
 <213> Homo sapiens

 <220>
 <221> SITE
 <222> (53)
 <223> Xaa equals stop translation

 <400> 192
 Met Leu Leu Pro Val Asn Thr Leu Leu Tyr Ile Leu Leu Thr Pro Leu
 1 5 10 15
 Cys Phe Phe Tyr Gly Thr Ser Arg Pro Pro Tyr Leu Glu Leu Val Thr
 20 25 30
 Leu Leu Lys Lys Lys Lys Gln Ser Val Gly Phe Ser Val Cys Ile Leu
 35 40 45
 Glu Ala Gly Arg Xaa
 50

 <210> 193

<211> 41
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (41)
<223> Xaa equals stop translation

<400> 193
Met Ile Ile Val Leu Phe Ser Leu Ser Phe Leu Pro Leu Leu Pro Ser
1 5 10 15
Leu Leu Leu Ser Ser Tyr Leu Cys Leu Phe Phe Phe Pro Ser Gln Ser
20 25 30
Pro Ser Ser Phe Phe Phe His Leu Xaa
35 40

<210> 194
<211> 72
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (25)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (72)
<223> Xaa equals stop translation

<400> 194
Met Thr Glu Gly His Val Phe Cys Phe Ala Leu Cys Cys Val Leu Val
1 5 10 15
Phe Leu Ser Met Thr Leu Leu Val Xaa Ser Leu Glu Lys Thr Asn Ala
20 25 30
Gly Gly Val Ile Ala Trp Gly Cys Ile Ser Val Ser Val Gln Thr Gln
35 40 45
Thr Phe Ser Ser Pro Thr Ser Tyr Gln Thr Leu Phe Ile Ala Cys Lys
50 55 60
Leu Trp Asn Pro Arg Lys Leu Xaa
65 70

<210> 195
<211> 60
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (37)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE

<222> (60)

<223> Xaa equals stop translation

<400> 195

Met Ile Gly Leu Thr Ile Ile Ala Cys Phe Ala Val Ile Val Ser Ala
 1 5 10 15

Lys Arg Ala Val Glu Arg His Glu Ser Leu Thr Ser Trp Asn Leu Ala
 20 25 30

Lys Lys Ala Lys Xaa Arg Glu Glu Ala Ala Leu Ala Ala Gln Ala Lys
 35 40 45

Ala Asn Asp Ile Leu Ser Asp Lys Val Phe Thr Xaa
 50 55 60

<210> 196

<211> 81

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (81)

<223> Xaa equals stop translation

<400> 196

Met Leu Thr Gly Ser His Pro Gln Thr His Thr Cys Trp Leu Gly Thr
 1 5 10 15

Arg Leu Trp Val Val Leu Ser Cys Leu Ala Ser Leu Thr Val Ser Asp
 20 25 30

Cys Pro Glu His Gln Val Ser Ser Cys Ile Ser Ser Trp Pro Gly Glu
 35 40 45

His Ser Val Ser Phe Gln Pro Phe Pro Pro Phe Pro His Ser Leu Gly
 50 55 60

Gly Thr Glu Val Gly Val Glu Glu Ser Gln Met Ala Gly Val Gly Ile
 65 70 75 80

Xaa

<210> 197

<211> 79

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (79)

<223> Xaa equals stop translation

<400> 197

Met Leu His Met Phe Leu Leu Leu Leu Tyr Phe Phe Lys Asn Ser Lys
 1 5 10 15

Ser Leu Phe Met Cys His Trp Ile Asn Leu Ser Asp Asn Val Ser His
 20 25 30

117

Lys Asn Leu Leu Asp Arg Leu Phe Phe Ser Cys Thr Leu Asn Gly Gly
 35 40 45
 Val Glu Val Ser Gly Glu Gln Trp Ile Thr Lys Ser Lys Leu Trp Lys
 50 55 60
 Ile Val Lys Arg Met Glu Lys Leu Asn Thr Arg Tyr Gln Lys Xaa
 65 70 75

<210> 198
 <211> 116
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (116)
 <223> Xaa equals stop translation

<400> 198
 Met Cys Met Ser Val Gly Ala His Ile Cys Val Cys Val Cys Met Cys
 1 5 10 15
 Val Leu His Val Cys Gly Glu Val Ser Ser Val Arg Ala Cys Asp Ser
 20 25 30
 Trp Asp Leu His Ser Cys Val Leu Pro Gln Arg Pro Gln Pro Gly Gln
 35 40 45
 Ala Leu Thr Phe Cys Ala Pro Cys Ile Glu Pro Val Cys Cys Gly Cys
 50 55 60
 Leu Trp Pro Pro Met Gly Asn Ser Gly Glu Leu Ala Gly Gly Cys Ala
 65 70 75 80
 Gln Ser Pro Gly Cys Cys Tyr Cys His Ser Ala Gln Leu Gly Gln Ala
 85 90 95
 Val Ala Pro Glu Gly Val Arg Arg Glu Leu Trp Glu His Leu Tyr Ser
 100 105 110
 Val Leu Lys Xaa
 115

<210> 199
 <211> 51
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (51)
 <223> Xaa equals stop translation

<400> 199
 Met Pro Gly Cys Trp Val Leu Glu Leu Val Asp His Trp Leu Ala Ser
 1 5 10 15
 Leu Trp Leu Val Val Ala Val Thr Glu Cys Ala Ala Arg Pro Glu Trp
 20 25 30
 Leu Phe Trp Leu Cys Pro Pro Ser Cys Ser Met Pro Gly Gly Gly Gly

35 40 45

Asp Thr Xaa
50

<210> 200
<211> 58
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (58)
<223> Xaa equals stop translation

<400> 200
Met Lys Phe Tyr Ala Val Leu Leu Ser Ile Cys Leu Leu Leu Ser Cys
1 5 10 15
Trp Cys Ala Cys His Val Arg Asp Cys Asn Leu Ile Cys Leu Phe Ser
20 25 30
Thr Val Lys Ala Ile Thr Arg Glu Leu Leu Gln Leu Pro Ser Tyr Val
35 40 45
Lys Arg Phe Phe Phe Asn Ser Leu Arg Xaa
50 55

<210> 201
<211> 57
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (57)
<223> Xaa equals stop translation

<400> 201
Met Leu Val Ala Pro Phe Asn Leu Leu Phe Glu Met Ala Pro Phe Asn
1 5 10 15
Ile Phe Leu Phe Pro Gln Trp Gly Leu Leu Trp Leu Met Leu Tyr Leu
20 25 30
Leu Tyr Val Phe Gln Ala Ser Leu Arg Thr Pro Glu Leu Thr Trp Glu
35 40 45
Arg Val Arg Ser Gln Val Asp Gln Xaa
50 55

<210> 202
<211> 50
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (50)
<223> Xaa equals stop translation

<400> 202
Met Leu Leu Thr Cys Ile Leu Leu His Leu Trp Ile Val Val Asp Ser
1 5 10 15
Val Ile Tyr Met Lys Pro Thr Ser Arg Asp Gly Cys Leu Leu Ser Ala
20 25 30
Leu Gln Met Ala Arg Ser Leu Ile Ile Gln Leu Asn His Ser Ser Ser
35 40 45
Asn Xaa
50

<210> 203
<211> 45
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (45)
<223> Xaa equals stop translation

<400> 203
Met Pro Leu Cys Gly Leu Tyr Cys Leu Arg Ile Leu Met Phe Pro Leu
1 5 10 15
Arg Ser Ala Asn Ser Val Pro Leu Gln Cys Leu Pro Pro Ser Ser Leu
20 25 30
Ala Asn Lys Asp Ser His Phe Arg Ala Pro Arg Lys Xaa
35 40 45

<210> 204
<211> 45
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (18)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (25)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (45)
<223> Xaa equals stop translation

<400> 204
Met Ser Pro Ser Pro Arg Trp Gly Phe Leu Cys Val Leu Phe Thr Ala
1 5 10 15
Val Xaa Pro Ala Pro Ser Thr Ala Xaa Val Gln Asp Lys Cys Pro Val
20 25 30
Asn Thr Trp Glu Ala Met Gln Ala Cys Val His Gly Xaa
35 40 45

<210> 205
 <211> 161
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (136)
 <223> Xaa equals any of the naturally occurring L-amino acids

<220>
 <221> SITE
 <222> (161)
 <223> Xaa equals stop translation

<400> 205
 Met Ala Phe Thr Phe Ala Ala Phe Cys Tyr Met Leu Ser Leu Val Leu
 1 5 10 15
 Cys Ala Ala Leu Ile Phe Phe Ala Ile Trp His Ile Ile Ala Phe Asp
 20 25 30
 Glu Leu Arg Thr Asp Phe Lys Ser Pro Ile Asp Gln Cys Asn Pro Val
 35 40 45
 His Ala Arg Glu Arg Leu Arg Asn Ile Glu Arg Ile Cys Phe Leu Leu
 50 55 60
 Arg Lys Leu Val Leu Pro Glu Tyr Ser Ile His Ser Leu Phe Cys Ile
 65 70 75 80
 Met Phe Leu Cys Ala Gln Glu Trp Leu Thr Leu Gly Leu Asn Val Pro
 85 90 95
 Leu Leu Phe Tyr His Phe Trp Arg Tyr Phe His Cys Pro Ala Asp Ser
 100 105 110
 Ser Glu Leu Ala Tyr Asp Pro Pro Val Val Met Asn Ala Asp Thr Leu
 115 120 125
 Ser Tyr Cys Gln Lys Glu Ala Xaa Cys Lys Leu Ala Phe Tyr Leu Leu
 130 135 140
 Ser Phe Phe Tyr Tyr Leu Tyr Cys Met Ile Tyr Thr Leu Val Ser Ser
 145 150 155 160
 Xaa

<210> 206
 <211> 198
 <212> PRT
 <213> Homo sapiens

<400> 206
 Met Tyr Arg Glu Arg Leu Arg Thr Leu Leu Val Ile Ala Val Val Met
 1 5 10 15
 Ser Leu Leu Asn Ala Leu Ser Thr Ser Gly Gly Ser Ile Ser Trp Asn
 20 25 30

Asp Phe Val His Glu Met Leu Ala Lys Gly Glu Val Gln Arg Val Gln
 35 40 45
 Val Val Pro Glu Ser Asp Val Val Glu Val Tyr Leu His Pro Gly Ala
 50 55 60
 Val Val Phe Gly Arg Pro Arg Leu Ala Leu Met Tyr Arg Met Gln Val
 65 70 75 80
 Ala Asn Ile Asp Lys Phe Glu Glu Lys Leu Arg Ala Ala Glu Asp Glu
 85 90 95
 Leu Asn Ile Glu Ala Lys Asp Arg Ile Pro Val Ser Tyr Lys Arg Thr
 100 105 110
 Gly Phe Phe Gly Lys Cys Pro Val Leu Cys Gly Asp Asp Gly Ser Gly
 115 120 125
 Pro Gly His Pro Val Val Cys Phe Pro Ser Gly Arg Asp Asp Trp Arg
 130 135 140
 His Arg Arg Arg Trp Thr Ser Arg Ser Arg Leu Leu Cys Trp Lys Ala
 145 150 155 160
 Leu Met Gly Ser Val Gly Ala Asp His Thr Arg Glu Leu Arg Lys Pro
 165 170 175
 Ser Gly Ser His Arg Pro Pro Phe Asn Val Val Ile Pro Trp Trp Trp
 180 185 190
 Lys Gln Asp Asp Gly Pro
 195

<210> 207
 <211> 60
 <212> PRT
 <213> Homo sapiens
 <220>
 <221> SITE
 <222> (60)
 <223> Xaa equals stop translation

<400> 207
 Met Asn Ser Thr Leu Cys Val Val Leu Ser Leu Met Cys Met Asn Ser
 1 5 10 15
 Thr Leu Cys Val Val Leu Ser Leu Thr His Ser Cys Pro Ser Pro Gln
 20 25 30
 Val Pro Lys Val His Tyr Met Ile Phe Met Pro Leu His Leu His Ser
 35 40 45
 Leu Ala Leu Thr Gln Leu Ile Ile Ile Tyr Lys Xaa
 50 55 60

<210> 208
 <211> 82
 <212> PRT
 <213> Homo sapiens
 <220>

<221> SITE
<222> (82)
<223> Xaa equals stop translation

<400> 208
Met Val Val Ala Gly Val Val Val Leu Ile Leu Ala Leu Val Leu Ala
1 5 10 15
Trp Leu Ser Thr Tyr Val Ala Asp Ser Gly Ser Asn Gln Leu Leu Gly
20 25 30
Ala Ile Val Ser Ala Gly Asp Thr Ser Val Leu His Leu Gly His Val
35 40 45
Asp His Leu Val Ala Gly Gln Gly Asn Pro Glu Pro Thr Glu Leu Pro
50 55 60
His Pro Ser Glu Asp Lys Gln Val Gln Ala Ala Val Gln Arg Pro
65 70 75 80
Pro Xaa

<210> 209
<211> 43
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (18)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (37)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (43)
<223> Xaa equals stop translation

<400> 209
Met Ala Gly Cys Leu Gly Ser Tyr Leu Leu Val Met Ile Leu Ile Leu
1 5 10 15
Cys Xaa Ala His Phe Phe Ile Cys Gly Asn Glu Asp Asn Arg Val Leu
20 25 30
Arg Tyr Asn Leu Xaa Thr Met Ser Val Thr Xaa
35 40

<210> 210
<211> 97
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (97)
<223> Xaa equals stop translation

<400> 210
Met Tyr Arg Glu Arg Leu Arg Thr Leu Leu Val Ile Ala Val Val Met
1 5 10 15
Ser Leu Leu Asn Ala Leu Ser Thr Ser Gly Gly Ser Ile Ser Trp Asn
20 25 30
Asp Phe Val His Glu Met Leu Ala Lys Gly Glu Val Gln Arg Val Gln
35 40 45
Val Val Pro Glu Ser Asp Val Val Glu Val Tyr Leu His Pro Gly Ala
50 55 60
Val Val Phe Gly Arg Pro Arg Leu Ala Leu Met Tyr Arg Met Gln Leu
65 70 75 80
Gln Ile Leu Thr Ser Leu Lys Arg Ser Phe Glu Gln Leu Lys Met Ser
85 90 95
Xaa

<210> 211
<211> 22
<212> PRT
<213> Homo sapiens

<400> 211
Trp Ala Gly Thr Gln Glu Pro Thr Gly Leu Pro Ser Thr Leu Ser Arg
1 5 10 15
Ser Glu Ser Trp Asp His
20

<210> 212
<211> 171
<212> PRT
<213> Homo sapiens

<400> 212
Glu Ile Ile His Asn Leu Pro Thr Ser Arg Met Ala Ala Arg Thr Lys
1 5 10 15
Lys Lys Asn Asp Ile Ile Asn Ile Lys Val Pro Ala Asp Cys Asn Thr
20 25 30
Arg Met Ser Tyr Tyr Tyr Lys Gly Ser Gly Lys Arg Gly Glu Met Glu
35 40 45
Ser Trp Leu Val Met Ser Ser Trp Ser Ile Leu Asp Phe Glu Phe Leu
50 55 60
Glu Ala Arg Pro Gln Leu Phe Asn Leu Val Tyr Thr Glu His Ser Thr
65 70 75 80
Tyr Ser Gly Arg His Tyr Thr Arg Glu Arg Gly Gly Phe Met Val Phe
85 90 95
Lys Asn Ser Tyr Ser Gln Leu Leu Leu Lys Arg Lys Asp Ser Leu Cys
100 105 110

124

Ala Phe Ile Gln Pro Met Ala Leu Asn Ile Ile His Val Pro Met Ser
 115 120 125

Ser Lys Cys Ile Phe Pro Ala Gln Ser Gly Pro Ser Thr Phe Arg Ser
 130 135 140

Leu Trp Trp Cys Pro His Pro Ile Ser Lys Cys Gln Leu Gly Leu Tyr
 145 150 155 160

Ser Ser Gln Ile Arg Asp Ile Pro Tyr Leu Ala
 165 170

<210> 213
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 213
 Glu Ile Ile His Asn Leu Pro Thr Ser Arg Met Ala Ala Arg Thr Lys
 1 5 10 15

Lys Lys Asn Asp Ile Ile Asn Ile Lys Val Pro Ala Asp Cys Asn Thr
 20 25 30

Arg Met Ser
 35

<210> 214
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 214
 Tyr Tyr Tyr Lys Gly Ser Gly Lys Arg Gly Glu Met Glu Ser Trp Leu
 1 5 10 15

Val Met Ser Ser Trp Ser Ile Leu Asp Phe Glu Phe Leu Glu Ala Arg
 20 25 30

Pro Gln Leu Phe
 35

<210> 215
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 215
 Asn Leu Val Tyr Thr Glu His Ser Thr Tyr Ser Gly Arg His Tyr Thr
 1 5 10 15

Arg Glu Arg Gly Gly Phe Met Val Phe Lys Asn Ser Tyr Ser Gln Leu
 20 25 30

Leu Leu Lys Arg
 35

<210> 216
 <211> 35
 <212> PRT

<213> Homo sapiens

<400> 216

Lys Asp Ser Leu Cys Ala Phe Ile Gln Pro Met Ala Leu Asn Ile Ile
 1 5 10 15

His Val Pro Met Ser Ser Lys Cys Ile Phe Pro Ala Gln Ser Gly Pro
 20 25 30

Ser Thr Phe
 35

<210> 217

<211> 29

<212> PRT

<213> Homo sapiens

<400> 217

Arg Ser Leu Trp Trp Cys Pro His Pro Ile Ser Lys Cys Gln Leu Gly
 1 5 10 15

Leu Tyr Ser Ser Gln Ile Arg Asp Ile Pro Tyr Leu Ala
 20 25

<210> 218

<211> 460

<212> PRT

<213> Homo sapiens

<400> 218

Met Phe Thr Ile Lys Leu Leu Leu Phe Ile Val Pro Leu Val Ile Ser
 1 5 10 15

Ser Arg Ile Asp Gln Asp Asn Ser Ser Phe Asp Ser Leu Ser Pro Glu
 20 25 30

Pro Lys Ser Arg Phe Ala Met Leu Asp Asp Val Lys Ile Leu Ala Asn
 35 40 45

Gly Leu Leu Gln Leu Gly His Gly Leu Lys Asp Phe Val His Lys Thr
 50 55 60

Lys Gly Gln Ile Asn Asp Ile Phe Gln Lys Leu Asn Ile Phe Asp Gln
 65 70 75 80

Ser Phe Tyr Asp Leu Ser Leu Gln Thr Ser Glu Ile Lys Glu Glu Glu
 85 90 95

Lys Glu Leu Arg Thr Thr Tyr Lys Leu Gln Val Lys Asn Glu Glu
 100 105 110

Val Lys Asn Met Ser Leu Glu Leu Asn Ser Lys Leu Glu Ser Leu Leu
 115 120 125

Glu Glu Lys Ile Leu Leu Gln Gln Lys Val Lys Tyr Leu Glu Glu Gln
 130 135 140

Leu Thr Asn Leu Ile Gln Asn Gln Pro Glu Thr Pro Glu His Pro Glu
 145 150 155 160

Val Thr Ser Leu Lys Thr Phe Val Glu Lys Gln Asp Asn Ser Ile Lys
 165 170 175

Asp Leu Leu Gln Thr Val Glu Asp Gln Tyr Lys Gln Leu Asn Gln Gln
 180 185 190
 His Ser Gln Ile Lys Glu Ile Glu Asn Gln Leu Arg Arg Thr Ser Ile
 195 200 205
 Gln Glu Pro Thr Glu Ile Ser Leu Ser Ser Lys Pro Arg Ala Pro Arg
 210 215 220
 Thr Thr Pro Phe Leu Gln Leu Asn Glu Ile Arg Asn Val Lys His Asp
 225 230 235 240
 Gly Ile Pro Ala Glu Cys Thr Thr Ile Tyr Asn Arg Gly Glu His Thr
 245 250 255
 Ser Gly Met Tyr Ala Ile Arg Pro Ser Asn Ser Gln Val Phe His Val
 260 265 270
 Tyr Cys Asp Val Ile Ser Gly Ser Pro Trp Thr Leu Ile Gln His Arg
 275 280 285
 Ile Asp Gly Ser Gln Asn Phe Asn Glu Thr Trp Glu Asn Tyr Lys Tyr
 290 295 300
 Gly Phe Gly Arg Leu Asp Gly Glu Phe Trp Leu Gly Leu Glu Lys Ile
 305 310 315 320
 Tyr Ser Ile Val Lys Gln Ser Asn Tyr Val Leu Arg Ile Glu Leu Glu
 325 330 335
 Asp Trp Lys Asp Asn Lys His Tyr Ile Glu Tyr Ser Phe Tyr Leu Gly
 340 345 350
 Asn His Glu Thr Asn Tyr Thr Leu His Leu Val Ala Ile Thr Gly Asn
 355 360 365
 Val Pro Asn Ala Ile Pro Glu Asn Lys Asp Leu Val Phe Ser Thr Trp
 370 375 380
 Asp His Lys Ala Lys Gly His Phe Asn Cys Pro Glu Gly Tyr Ser Gly
 385 390 395 400
 Gly Trp Trp Trp His Asp Glu Cys Gly Glu Asn Asn Leu Asn Gly Lys
 405 410 415
 Tyr Asn Lys Pro Arg Ala Lys Ser Lys Pro Glu Arg Arg Arg Gly Leu
 420 425 430
 Ser Trp Lys Ser Gln Asn Gly Arg Leu Tyr Ser Ile Lys Ser Thr Lys
 435 440 445
 Met Leu Ile His Pro Thr Asp Ser Glu Ser Phe Glu
 450 455 460

<210> 219

<211> 37

<212> PRT

<213> Homo sapiens

<400> 219

Met Phe Thr Ile Lys Leu Leu Leu Phe Ile Val Pro Leu Val Ile Ser
 1 5 10 15

Ser Arg Ile Asp Gln Asp Asn Ser Ser Phe Asp Ser Leu Ser Pro Glu
 20 25 30

Pro Lys Ser Arg Phe
 35

<210> 220
 <211> 34
 <212> PRT
 <213> Homo sapiens

<400> 220
 Ala Met Leu Asp Asp Val Lys Ile Leu Ala Asn Gly Leu Leu Gln Leu
 1 5 10 15
 Gly His Gly Leu Lys Asp Phe Val His Lys Thr Lys Gly Gln Ile Asn
 20 25 30

Asp Ile

<210> 221
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 221
 Phe Gln Lys Leu Asn Ile Phe Asp Gln Ser Phe Tyr Asp Leu Ser Leu
 1 5 10 15
 Gln Thr Ser Glu Ile Lys Glu Glu Glu Lys Glu Leu Arg Arg Thr Thr
 20 25 30

Tyr Lys Leu
 35

<210> 222
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 222
 Gln Val Lys Asn Glu Glu Val Lys Asn Met Ser Leu Glu Leu Asn Ser
 1 5 10 15
 Lys Leu Glu Ser Leu Leu Glu Glu Lys Ile Leu Leu Gln Gln Lys Val
 20 25 30

Lys Tyr Leu Glu
 35

<210> 223
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 223
 Glu Gln Leu Thr Asn Leu Ile Gln Asn Gln Pro Glu Thr Pro Glu His
 1 5 10 15

Pro Glu Val Thr Ser Leu Lys Thr Phe Val Glu Lys Gln Asp Asn Ser
 20 25 30

Ile Lys Asp Leu
 35

<210> 224
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 224
 Leu Gln Thr Val Glu Asp Gln Tyr Lys Gln Leu Asn Gln Gln His Ser
 1 5 10 15

Gln Ile Lys Glu Ile Glu Asn Gln Leu Arg Arg Thr Ser Ile Gln Glu
 20 25 30

Pro Thr Glu
 35

<210> 225
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 225
 Ile Ser Leu Ser Ser Lys Pro Arg Ala Pro Arg Thr Thr Pro Phe Leu
 1 5 10 15

Gln Leu Asn Glu Ile Arg Asn Val Lys His Asp Gly Ile Pro Ala Glu
 20 25 30

Cys Thr Thr
 35

<210> 226
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 226
 Ile Tyr Asn Arg Gly Glu His Thr Ser Gly Met Tyr Ala Ile Arg Pro
 1 5 10 15

Ser Asn Ser Gln Val Phe His Val Tyr Cys Asp Val Ile Ser Gly Ser
 20 25 30

Pro Trp Thr Leu
 35

<210> 227
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 227
 Ile Gln His Arg Ile Asp Gly Ser Gln Asn Phe Asn Glu Thr Trp Glu
 1 5 10 15

Asn Tyr Lys Tyr Gly Phe Gly Arg Leu Asp Gly Glu Phe Trp Leu Gly
 20 25 30

Leu Glu Lys Ile
 35

<210> 228
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 228
 Tyr Ser Ile Val Lys Gln Ser Asn Tyr Val Leu Arg Ile Glu Leu Glu
 1 5 10 15
 Asp Trp Lys Asp Asn Lys His Tyr Ile Glu Tyr Ser Phe Tyr Leu Gly
 20 25 30

Asn His Glu
 35

<210> 229
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 229
 Thr Asn Tyr Thr Leu His Leu Val Ala Ile Thr Gly Asn Val Pro Asn
 1 5 10 15
 Ala Ile Pro Glu Asn Lys Asp Leu Val Phe Ser Thr Trp Asp His Lys
 20 25 30

Ala Lys Gly
 35

<210> 230
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 230
 His Phe Asn Cys Pro Glu Gly Tyr Ser Gly Gly Trp Trp Trp His Asp
 1 5 10 15
 Glu Cys Gly Glu Asn Asn Leu Asn Gly Lys Tyr Asn Lys Pro Arg Ala
 20 25 30

Lys Ser Lys Pro
 35

<210> 231
 <211> 34
 <212> PRT
 <213> Homo sapiens

<400> 231
 Glu Arg Arg Arg Gly Leu Ser Trp Lys Ser Gln Asn Gly Arg Leu Tyr
 1 5 10 15

Ser Ile Lys Ser Thr Lys Met Leu Ile His Pro Thr Asp Ser Glu Ser
 20 25 30

Phe Glu

<210> 232
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 232
 Leu Pro Pro Arg Gly Pro Ala Thr Phe Gly Ser Pro Gly Cys Pro Pro
 1 5 10 15

Ala Asn Ser Pro Pro Ser Ala Pro Ala Thr Pro Glu Pro Ala Arg Ala
 20 25 30

Pro Glu Arg Val
 35

<210> 233
 <211> 44
 <212> PRT
 <213> Homo sapiens

<400> 233
 Gly Thr Arg Ala Gly Val Ser Lys Tyr Thr Gly Gly Arg Gly Val Thr
 1 5 10 15

Trp Ala Pro Ser Ser Ala Ala Val Pro Arg Ile Ser Ser Ala Thr Met
 20 25 30

Arg Met Gly Leu Thr Ser Phe Ser Thr Thr Gly Ala
 35 40

<210> 234
 <211> 306
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (293)
 <223> Xaa equals any of the naturally occurring L-amino acids

<400> 234
 Trp Gln Ser Gly His Arg Leu Trp Gln Leu Glu Trp Pro Pro Pro Pro
 1 5 10 15

Leu Ser Ala Asp Glu His Pro Trp Glu Gly Pro Leu Pro Gly Thr Ser
 20 25 30

Pro Ser Pro Lys Phe Ser Met Pro Ser Pro Val Pro His Gly His His
 35 40 45

Arg Pro Thr Leu Thr Met Thr Arg Ser Trp Arg Ile Phe Phe Asn Asn
 50 55 60

Ile Ala Tyr Arg Ser Ser Ser Ala Asn Arg Leu Phe Arg Val Ile Arg

[illegible]

<210> 236
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 236
 Phe Ser Met Pro Ser Pro Val Pro His Gly His His Arg Pro Thr Leu
 1 5 10 15
 Thr Met Thr Arg Ser Trp Arg Ile Phe Phe Asn Asn Ile Ala Tyr Arg
 20 25 30
 Ser Ser Ser
 35

<210> 237
 <211> 37
 <212> PRT
 <213> Homo sapiens

<400> 237
 Ala Asn Arg Leu Phe Arg Val Ile Arg Arg Glu His Gly Asp Pro Leu
 1 5 10 15
 Ile Glu Glu Leu Asn Pro Gly Asp Ala Leu Glu Pro Glu Gly Arg Gly
 20 25 30
 Thr Gly Gly Val Val
 35

<210> 238
 <211> 34
 <212> PRT
 <213> Homo sapiens

<400> 238
 Thr Asp Phe Asp Gly Asp Gly Met Leu Asp Leu Ile Leu Ser His Gly
 1 5 10 15
 Glu Ser Met Ala Gln Pro Leu Ser Val Phe Arg Gly Asn Gln Gly Phe
 20 25 30
 Asn Asn

<210> 239
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 239
 Asn Trp Leu Arg Val Val Pro Arg Thr Arg Phe Gly Ala Phe Ala Arg
 1 5 10 15
 Gly Ala Lys Val Val Leu Tyr Thr Lys Lys Ser Gly Ala His Leu Arg
 20 25 30
 Ile Ile Asp
 35

<210> 240
<211> 36
<212> PRT
<213> Homo sapiens

<400> 240
Gly Gly Ser Gly Tyr Leu Cys Glu Met Glu Pro Val Ala His Phe Gly
1 5 10 15
Leu Gly Lys Asp Glu Ala Ser Ser Val Glu Val Thr Trp Pro Asp Gly
20 25 30
Lys Met Val Ser
35

<210> 241
<211> 35
<212> PRT
<213> Homo sapiens

<400> 241
Arg Asn Val Ala Ser Gly Glu Met Asn Ser Val Leu Glu Ile Leu Tyr
1 5 10 15
Pro Arg Asp Glu Asp Thr Leu Gln Asp Pro Ala Pro Leu Glu Cys Gly
20 25 30
Gln Gly Phe
35

<210> 242
<211> 36
<212> PRT
<213> Homo sapiens

<400> 242
Ser Gln Gln Glu Asn Gly His Cys Met Asp Thr Asn Glu Cys Ile Gln
1 5 10 15
Phe Pro Phe Val Cys Pro Arg Asp Lys Pro Val Cys Val Asn Thr Tyr
20 25 30
Gly Ser Tyr Arg
35

<210> 243
<211> 22
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (9)
<223> Xaa equals any of the naturally occurring L-amino acids

<400> 243
Cys Arg Thr Asn Lys Lys Cys Ser Xaa Gly Leu Arg Val Pro Thr Arg
1 5 10 15
Met Ala His Thr Gly Leu
20

<210> 244
<211> 9
<212> PRT
<213> Homo sapiens

<400> 244
Gln Ser Pro Ile Asp Ile Gln Thr Asp
1 5

<210> 245
<211> 18
<212> PRT
<213> Homo sapiens

<400> 245
Leu His Asn Asn Gly His Thr Val Gln Leu Ser Leu Pro Ser Thr Leu
1 5 10 15

Tyr Leu

<210> 246
<211> 11
<212> PRT
<213> Homo sapiens

<400> 246
Tyr Val Ala Ala Gln Leu His Leu His Trp Gly
1 5 10

<210> 247
<211> 11
<212> PRT
<213> Homo sapiens

<400> 247
Ala Glu Leu His Ile Val His Tyr Asp Ser Asp
1 5 10

<210> 248
<211> 16
<212> PRT
<213> Homo sapiens

<400> 248
Gly Gln His Trp Thr Tyr Glu Gly Pro His Gly Gln Asp His Trp Pro
1 5 10 15

<210> 249
<211> 14
<212> PRT
<213> Homo sapiens

<400> 249

Gln Ser Pro Ile Asp Ile Gln Thr Asp Ser Val Thr Phe Asp
 1 5 10

<210> 250
 <211> 15
 <212> PRT
 <213> Homo sapiens

<400> 250
 Leu His Asn Asn Gly His Thr Val Gln Leu Ser Leu Pro Ser Thr
 1 5 10 15

<210> 251
 <211> 12
 <212> PRT
 <213> Homo sapiens

<400> 251
 Lys Tyr Val Ala Ala Gln Leu His Leu His Trp Gly
 1 5 10

<210> 252
 <211> 13
 <212> PRT
 <213> Homo sapiens

<400> 252
 Ala Glu Leu His Ile Val His Tyr Asp Ser Asp Ser Tyr
 1 5 10

<210> 253
 <211> 1667
 <212> DNA
 <213> Homo sapiens

<400> 253
 GGCCGCGCCG CCGCTGCCGC CGCCGCGCGC GATTCTGCTT CTCAGAAGAT GCACTATTAT 60
 AGATACTCTA ACGCCAAGGT CAGCTGCTGG TACAAGTACC TCCTTTTCAG CTACAACATC 120
 ATCTTCTGAT TGGCTGGAGT TGTCTTCCTT GGAGTCGGGC TGTGGGCATG GAGCGAAAAG 180
 GGTGTGCTGT CCGACCTCAC CAAAGTGACC CGGATGCATG GAATCGACCC TGTGGTGCTG 240
 GTCCTGATGG TGGGCGTGGT GATGTTCAAC CTGGGGTTCG CCGGCTGCGT GGGGGCTCTG 300
 CGGGAGAATA TCTGCTTGCT CAACTTTTTC TGTGGCACCA TCGTGCTCAT CTCTTCCTG 360
 GAGCTGGCTG TGGCCGTGCT GGCCTTCCTG TTCCAGGACT GGGTGAGGGA CCGGTTCCGG 420
 GAGTTCTTCG AGAGCAACAT CAAGTCCTAC CGGGACGATA TCGATCTGCA AAACCTCATC 480
 GACTCCCTTC AGAAAGCTAA CAGTGCTGT GGCGCATATG GCCCTGAAAG ACTGGGACCT 540
 CAGACGTCTA CTTCAATTGC AGCGGTGCCA GCTACAGCCG AGAGAATGCG GGGTCCCCTT 600
 CTCCTGCTGC GTGCCAGATC CTGCGCAAAA AGTTGTGAAC ACACAGTGTG GATATGATGT 660
 CAGGATTCAG CTGAAGAGCA AGTGGGATGA GTCCATCTTC ACGAAAGGCT GCATCCAGGC 720

GCTGGAAAGC TGGCTCCCGC GGAACATTTA CATGTGGCT GCGCTCTTCA TCGCCATCTC 780
 GCTGTTCAG ATATTTGGCA TCTTCCTGGC AAGGACGCTG ATCTCAGACA TCGAGGCAGT 840
 GAAGGCCGGC CATCACTTCT GAGGAGCAGA GTTGAGGGAG CCGAGCTGAG CCACGCTGGG 900
 AGGCCAGAGC CTTTCTCTGC CATCAGCCCT ACGTCCAGAG GGAGAGGAGC CGACACCCCC 960
 AGAGCCAGTG CCCCATCTTA AGCATCAGCG TGACGTGACC TCTCTGTTTC TGCTTGCTGG 1020
 TGCTGAAGAC CAAGGGTCCC CCTTGTTACC TGCCCAAAC TGTGACTGCA TCCCTCTGGA 1080
 GTCTACCCAG AGACAGAGAA TGTGTCTTTA TGTGGGAGTG GTGACTCTGA AAGACAGAGA 1140
 GGGCTCCTGT GGCTGCCAGG AGGGCTTGAC TCAGACCCCC TGCAGCTCAA GCATGTCTGC 1200
 AGGACACCTG GTCCCCCTCT CCCAGTGGCA TCCCAAACAT CTGCTTTGGG TCCATCCCAC 1260
 ATCTGTGGGT GGGCCCGTGG GTAAGAAGGG AACCCACAG GCGTGAACA GGGCATCCTC 1320
 TCTCCCATCC AAGCAAAGCC AGCATGGGG CCTGCCCCGTA ACGGGAGGCG GACGTGGCCC 1380
 CGCTGGGCCT CTGAGTGCCA GCGCAGTCTG CTGGGACATG CACATATCAG GGGTGTGTTG 1440
 CAGGATCCTC AGCCATGTTT AAGTGAAGTA AGCCTGAGCC AGTGCCTGGA CTGGTGCCAC 1500
 GGGAGTGCTT TGTCCACTGT CCCCCTGTGT CCACCAGCTA TTCTCCTGGC GCCGGAAGTG 1560
 CCTCTGGTCT TGATAGCATT AAGCCCTGAT TGGCCGGTGG CGCGGTGGGC ATGGTCTCTC 1620
 ACTGAGAGCC GGCTCTCCTT TTCTTAAAGT GTGTAAATAG TTTATTT 1667

<210> 254

<211> 270

<212> PRT

<213> Homo sapiens

<400> 254

Met His Tyr Tyr Arg Tyr Ser Asn Ala Lys Val Ser Cys Trp Tyr Lys
 1 5 10 15
 Tyr Leu Leu Phe Ser Tyr Asn Ile Ile Phe Trp Leu Ala Gly Val Val
 20 25 30
 Phe Leu Gly Val Gly Leu Trp Ala Trp Ser Glu Lys Gly Val Leu Ser
 35 40 45
 Asp Leu Thr Lys Val Thr Arg Met His Gly Ile Asp Pro Val Val Leu
 50 55 60
 Val Leu Met Val Gly Val Val Met Phe Thr Leu Gly Phe Ala Gly Cys
 65 70 75 80
 Val Gly Ala Leu Arg Glu Asn Ile Cys Leu Leu Asn Phe Phe Cys Gly
 85 90 95
 Thr Ile Val Leu Ile Phe Phe Leu Glu Leu Ala Val Ala Val Leu Ala
 100 105 110
 Phe Leu Phe Gln Asp Trp Val Arg Asp Arg Phe Arg Glu Phe Phe Glu
 115 120 125

137

Ser Asn Ile Lys Ser Tyr Arg Asp Asp Ile Asp Leu Gln Asn Leu Ile
 130 135 140
 Asp Ser Leu Gln Lys Ala Asn Gln Cys Cys Gly Ala Tyr Gly Pro Glu
 145 150 155 160
 Asp Trp Asp Leu Asn Val Tyr Phe Asn Cys Ser Gly Ala Ser Tyr Ser
 165 170 175
 Arg Glu Lys Cys Gly Val Pro Phe Ser Cys Cys Val Pro Asp Pro Ala
 180 185 190
 Gln Lys Val Val Asn Thr Gln Cys Gly Tyr Asp Val Arg Ile Gln Leu
 195 200 205
 Lys Ser Lys Trp Asp Glu Ser Ile Phe Thr Lys Gly Cys Ile Gln Ala
 210 215 220
 Leu Glu Ser Trp Leu Pro Arg Asn Ile Tyr Ile Val Ala Gly Val Phe
 225 230 235 240
 Ile Ala Ile Ser Leu Leu Gln Ile Phe Gly Ile Phe Leu Ala Arg Thr
 245 250 255
 Leu Ile Ser Asp Ile Glu Ala Val Lys Ala Gly His His Phe
 260 265 270

<210> 255

<211> 277

<212> PRT

<213> Homo sapiens

<400> 255

Ser Gly Asn Leu Gly Ser Ala Asp Gly Trp Ala Tyr Ile Asp Val Glu
 1 5 10 15
 Val Arg Arg Pro Trp Ala Phe Val Gly Pro Gly Cys Ser Arg Ser Ser
 20 25 30
 Gly Asn Gly Ser Thr Ala Tyr Gly Leu Val Gly Ser Pro Arg Trp Leu
 35 40 45
 Ser Pro Phe His Thr Gly Gly Ala Val Ser Leu Pro Arg Arg Pro Arg
 50 55 60
 Gly Pro Gly Pro Val Leu Gly Val Ala Arg Pro Cys Leu Arg Cys Val
 65 70 75 80
 Leu Arg Pro Glu His Tyr Glu Pro Gly Ser His Tyr Ser Gly Phe Ala
 85 90 95
 Gly Arg Asp Ala Ser Arg Ala Phe Val Thr Gly Asp Cys Ser Glu Ala
 100 105 110
 Gly Leu Val Asp Asp Val Ser Asp Leu Ser Ala Ala Glu Met Leu Thr
 115 120 125
 Leu His Asn Trp Leu Ser Phe Tyr Glu Lys Asn Tyr Val Cys Val Gly
 130 135 140
 Arg Val Thr Gly Arg Phe Tyr Gly Glu Asp Gly Leu Pro Thr Pro Ala
 145 150 155 160

138

Leu Thr Gln Val Glu Ala Ala Ile Thr Arg Gly Leu Glu Ala Asn Lys
 165 170 175
 Leu Gln Leu Gln Glu Lys Gln Thr Phe Pro Pro Cys Asn Ala Glu Trp
 180 185 190
 Ser Ser Ala Arg Gly Ser Arg Leu Trp Cys Ser Gln Lys Ser Gly Gly
 195 200 205
 Val Ser Arg Asp Trp Ile Gly Val Pro Arg Lys Leu Tyr Lys Pro Gly
 210 215 220
 Ala Lys Glu Pro Arg Cys Val Cys Val Arg Thr Thr Gly Pro Pro Ser
 225 230 235 240
 Gly Gln Met Pro Asp Asn Pro Pro His Arg Asn Arg Gly Asp Leu Asp
 245 250 255
 His Pro Asn Leu Ala Glu Tyr Thr Gly Cys Pro Pro Leu Ala Ile Thr
 260 265 270
 Cys Ser Phe Pro Leu
 275

<210> 256
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 256
 Ser Gly Asn Leu Gly Ser Ala Asp Gly Trp Ala Tyr Ile Asp Val Glu
 1 5 10 15
 Val Arg Arg Pro Trp Ala Phe Val Gly Pro Gly Cys Ser Arg Ser Ser
 20 25 30
 Gly Asn Gly Ser
 35

<210> 257
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 257
 Thr Ala Tyr Gly Leu Val Gly Ser Pro Arg Trp Leu Ser Pro Phe His
 1 5 10 15
 Thr Gly Gly Ala Val Ser Leu Pro Arg Arg Pro Arg Gly Pro Gly Pro
 20 25 30
 Val Leu Gly Val
 35

<210> 258
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 258
 Ala Arg Pro Cys Leu Arg Cys Val Leu Arg Pro Glu His Tyr Glu Pro

139

1 5 10 15
 Gly Ser His Tyr Ser Gly Phe Ala Gly Arg Asp Ala Ser Arg Ala Phe
 20 25 30
 Val Thr Gly Asp
 35

<210> 259
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 259
 Cys Ser Glu Ala Gly Leu Val Asp Asp Val Ser Asp Leu Ser Ala Ala
 1 5 10 15
 Glu Met Leu Thr Leu His Asn Trp Leu Ser Phe Tyr Glu Lys Asn Tyr
 20 25 30
 Val Cys Val Gly
 35

<210> 260
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 260
 Arg Val Thr Gly Arg Phe Tyr Gly Glu Asp Gly Leu Pro Thr Pro Ala
 1 5 10 15
 Leu Thr Gln Val Glu Ala Ala Ile Thr Arg Gly Leu Glu Ala Asn Lys
 20 25 30
 Leu Gln Leu Gln
 35

<210> 261
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 261
 Glu Lys Gln Thr Phe Pro Pro Cys Asn Ala Glu Trp Ser Ser Ala Arg
 1 5 10 15
 Gly Ser Arg Leu Trp Cys Ser Gln Lys Ser Gly Gly Val Ser Arg Asp
 20 25 30
 Trp Ile Gly Val
 35

<210> 262
 <211> 29
 <212> PRT
 <213> Homo sapiens

<400> 262
 Pro Arg Lys Leu Tyr Lys Pro Gly Ala Lys Glu Pro Arg Cys Val Cys

140

1 5 10 15
Val Arg Thr Thr Gly Pro Pro Ser Gly Gln Met Pro Asp
20 25

<210> 263
<211> 32
<212> PRT
<213> Homo sapiens

<400> 263
Asn Pro Pro His Arg Asn Arg Gly Asp Leu Asp His Pro Asn Leu Ala
1 5 10 15
Glu Tyr Thr Gly Cys Pro Pro Leu Ala Ile Thr Cys Ser Phe Pro Leu
20 25 30

<210> 264
<211> 15
<212> PRT
<213> Homo sapiens

<400> 264
Arg Asp Asn Asp Tyr Leu Leu His Gly His Arg Pro Pro Met Phe
1 5 10 15

<210> 265
<211> 24
<212> PRT
<213> Homo sapiens

<400> 265
Ser Phe Arg Ala Cys Phe Lys Ser Ile Phe Arg Ile His Thr Glu Thr
1 5 10 15
Gly Asn Ile Trp Thr His Leu Leu
20

<210> 266
<211> 29
<212> PRT
<213> Homo sapiens

<400> 266
Gly Phe Val Leu Phe Leu Phe Leu Gly Ile Leu Thr Met Leu Arg Pro
1 5 10 15
Asn Met Tyr Phe Met Ala Pro Leu Gln Glu Lys Val Val
20 25

<210> 267
<211> 457
<212> PRT
<213> Homo sapiens

<400> 267

141

Thr Gly Pro Glu Phe Pro Gly Ser Asn Ser Thr Val Ala Arg Arg Ile
 1 5 10 15
 Lys Asp Leu Ala Ala Asp Ile Glu Glu Glu Leu Val Cys Arg Leu Lys
 20 25 30
 Ile Cys Asp Gly Phe Ser Leu Gln Leu Asp Glu Ser Ala Asp Val Ser
 35 40 45
 Gly Leu Ala Val Leu Leu Val Phe Val Arg Tyr Arg Phe Asn Lys Ser
 50 55 60
 Ile Glu Glu Asp Leu Leu Leu Cys Glu Ser Leu Gln Ser Asn Ala Thr
 65 70 75 80
 Gly Glu Glu Ile Phe Asn Cys Ile Asn Ser Phe Met Gln Lys His Glu
 85 90 95
 Ile Glu Trp Glu Lys Cys Val Asp Val Cys Ser Asp Ala Ser Arg Ala
 100 105 110
 Val Asp Gly Lys Ile Ala Glu Ala Val Thr Leu Ile Lys Tyr Val Ala
 115 120 125
 Pro Glu Ser Thr Ser Ser His Cys Leu Leu Tyr Arg His Ala Leu Ala
 130 135 140
 Val Lys Ile Met Pro Thr Ser Leu Lys Asn Val Leu Asp Gln Ala Val
 145 150 155 160
 Gln Ile Ile Asn Tyr Ile Lys Ala Arg Pro His Gln Ser Arg Leu Leu
 165 170 175
 Lys Ile Leu Cys Glu Glu Met Gly Ala Gln His Thr Ala Leu Leu Leu
 180 185 190
 Asn Thr Glu Val Arg Trp Leu Ser Arg Gly Lys Val Leu Val Arg Leu
 195 200 205
 Phe Glu Leu Arg Arg Glu Leu Leu Val Phe Met Asp Ser Ala Phe Arg
 210 215 220
 Leu Ser Asp Cys Leu Thr Asn Ser Ser Trp Leu Leu Arg Leu Ala Tyr
 225 230 235 240
 Leu Ala Asp Ile Phe Thr Lys Leu Asn Glu Val Asn Leu Ser Met Gln
 245 250 255
 Gly Lys Asn Val Thr Val Phe Thr Val Phe Asp Lys Met Ser Ser Leu
 260 265 270
 Leu Arg Lys Leu Glu Phe Trp Ala Ser Ser Val Glu Glu Glu Asn Phe
 275 280 285
 Asp Cys Phe Pro Thr Leu Ser Asp Phe Leu Thr Glu Ile Asn Ser Thr
 290 295 300
 Val Asp Lys Asp Ile Cys Ser Ala Ile Val Gln His Leu Arg Gly Leu
 305 310 315 320
 Arg Ala Thr Leu Leu Lys Tyr Phe Pro Val Thr Asn Asp Asn Ala
 325 330 335
 Trp Val Arg Asn Pro Phe Thr Val Thr Val Lys Pro Ala Ser Leu Val

340 345 350
 Ala Arg Asp Tyr Glu Ser Leu Ile Asp Leu Thr Ser Asp Ser Gln Val
 355 360 365
 Lys Gln Asn Phe Ser Glu Leu Ser Leu Asn Asp Phe Trp Ser Ser Leu
 370 375 380
 Ile Gln Glu Tyr Pro Ser Ile Ala Arg Arg Ala Val Arg Val Leu Leu
 385 390 395 400
 Pro Phe Ala Thr Met His Leu Cys Glu Thr Gly Phe Ser Tyr Tyr Ala
 405 410 415
 Ala Thr Lys Thr Lys Tyr Arg Lys Arg Leu Asp Ala Ala Pro His Met
 420 425 430
 Arg Ile Arg Leu Ser Asn Ile Thr Pro Asn Ile Lys Arg Ile Cys Asp
 435 440 445
 Lys Lys Thr Gln Lys His Cys Ser His
 450 455

<210> 268
 <211> 31
 <212> PRT
 <213> Homo sapiens

<400> 268
 Asp Ile Glu Glu Glu Leu Val Cys Arg Leu Lys Ile Cys Asp Gly Phe
 1 5 10 15
 Ser Leu Gln Leu Asp Glu Ser Ala Asp Val Ser Gly Leu Ala Val
 20 25 30

<210> 269
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 269
 Asn Ser Phe Met Gln Lys His Glu Ile Glu Trp Glu Lys Cys Val Asp
 1 5 10 15
 Val Cys Ser Asp Ala Ser Arg Ala Val Asp Gly Lys Ile Ala Glu Ala
 20 25 30

Val Thr Leu Ile
 35

<210> 270
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 270
 Leu Asp Gln Ala Val Gln Ile Ile Asn Tyr Ile Lys Ala Arg Pro His
 1 5 10 15
 Gln Ser Arg Leu Leu Lys Ile Leu Cys Glu Glu Met Gly Ala Gln His
 20 25 30

Thr Ala Leu Leu
35

<210> 271
<211> 49
<212> PRT
<213> Homo sapiens

<400> 271
Ser Ala Phe Arg Leu Ser Asp Cys Leu Thr Asn Ser Ser Trp Leu Leu
1 5 10 15
Arg Leu Ala Tyr Leu Ala Asp Ile Phe Thr Lys Leu Asn Glu Val Asn
20 25 30
Leu Ser Met Gln Gly Lys Asn Val Thr Val Phe Thr Val Phe Asp Lys
35 40 45

Met

<210> 272
<211> 32
<212> PRT
<213> Homo sapiens

<400> 272
Ser Asp Phe Leu Thr Glu Ile Asn Ser Thr Val Asp Lys Asp Ile Cys
1 5 10 15
Ser Ala Ile Val Gln His Leu Arg Gly Leu Arg Ala Thr Leu Leu Lys
20 25 30

<210> 273
<211> 38
<212> PRT
<213> Homo sapiens

<400> 273
Ser Asp Ser Gln Val Lys Gln Asn Phe Ser Glu Leu Ser Leu Asn Asp
1 5 10 15
Phe Trp Ser Ser Leu Ile Gln Glu Tyr Pro Ser Ile Ala Arg Arg Ala
20 25 30
Val Arg Val Leu Leu Pro
35

<210> 274
<211> 26
<212> PRT
<213> Homo sapiens

<400> 274
Asp Ser Arg Ile Ser Leu Leu Val Asn Asn Ala Gly Val Gly Ala Thr
1 5 10 15

Ala Ser Leu Leu Glu Ser Asp Ala Asp Lys
 20 25

<210> 275
 <211> 146
 <212> PRT
 <213> Homo sapiens

<400> 275
 Gly Thr Pro Ala Gly Thr Gly Pro Glu Phe Pro Gly Arg Pro Thr Arg
 1 5 10 15
 Pro Ser Arg Thr Glu Ser Ala Gln Thr Thr Gln His Ser Pro Leu Arg
 20 25 30
 Pro Leu Trp Arg Leu Lys Arg Asp Ser Ser Pro Cys His Pro Gln Thr
 35 40 45
 Arg Ala Asp Trp Gly Val Cys Pro Pro Trp Gly Gly Ala Ala Gln Gly
 50 55 60
 Leu Arg Pro Gly Cys His Leu Ala Pro Arg Arg Cys Leu Cys Pro Gly
 65 70 75 80
 Ser Cys Cys Pro Trp His Trp Ala Glu Ala Gln Trp Ser Phe Leu Trp
 85 90 95
 Arg Gly Leu Trp Gly Leu Arg Thr Leu Pro Thr Ala Leu Arg Ala Ser
 100 105 110
 Pro Ala Ala Ser Gly Thr Val Thr Tyr Ser Ala Cys Leu Gly Thr Ser
 115 120 125
 Cys Leu Leu Arg Ala Pro Cys Trp Arg Leu Arg Thr Cys Arg Gln Ser
 130 135 140
 Trp Cys
 145

<210> 276
 <211> 28
 <212> PRT
 <213> Homo sapiens

<400> 276
 Gly Thr Pro Ala Gly Thr Gly Pro Glu Phe Pro Gly Arg Pro Thr Arg
 1 5 10 15
 Pro Ser Arg Thr Glu Ser Ala Gln Thr Thr Gln His
 20 25

<210> 277
 <211> 30
 <212> PRT
 <213> Homo sapiens

<400> 277
 Ser Pro Leu Arg Pro Leu Trp Arg Leu Lys Arg Asp Ser Ser Pro Cys
 1 5 10 15

His Pro Gln Thr Arg Ala Asp Trp Gly Val Cys Pro Pro Trp
 20 25 30

<210> 278
 <211> 30
 <212> PRT
 <213> Homo sapiens

<400> 278
 Gly Gly Ala Ala Gln Gly Leu Arg Pro Gly Cys His Leu Ala Pro Arg
 1 5 10 15

Arg Cys Leu Cys Pro Gly Ser Cys Cys Pro Trp His Trp Ala
 20 25 30

<210> 279
 <211> 30
 <212> PRT
 <213> Homo sapiens

<400> 279
 Glu Ala Gln Trp Ser Phe Leu Trp Arg Gly Leu Trp Gly Leu Arg Thr
 1 5 10 15

Leu Pro Thr Ala Leu Arg Ala Ser Pro Ala Ala Ser Gly Thr
 20 25 30

<210> 280
 <211> 28
 <212> PRT
 <213> Homo sapiens

<400> 280
 Val Thr Tyr Ser Ala Cys Leu Gly Thr Ser Cys Leu Leu Arg Ala Pro
 1 5 10 15

Cys Trp Arg Leu Arg Thr Cys Arg Gln Ser Trp Cys
 20 25

<210> 281
 <211> 11
 <212> PRT
 <213> Homo sapiens

<400> 281
 Pro Pro Arg Pro Ser Thr Ser Gly Gln Trp Gly
 1 5 10

<210> 282
 <211> 11
 <212> PRT
 <213> Homo sapiens

<400> 282
 Arg Arg Ser Pro Phe Thr Ser Ala Gln Thr Gly
 1 5 10

<210> 283

146

<211> 23
 <212> PRT
 <213> Homo sapiens

<400> 283
 Gly Thr Gly Trp Asp Phe Gly Leu Ala Ala Val Cys Leu Arg Ala Ala
 1 5 10 15
 Glu Val Ala Gly Ser Phe Lys
 20

<210> 284
 <211> 146
 <212> PRT
 <213> Homo sapiens

<400> 284
 Gly Tyr Arg Arg Val Phe Glu Glu Tyr Met Arg Val Ile Ser Gln Arg
 1 5 10 15
 Tyr Pro Asp Ile Arg Ile Glu Gly Glu Asn Tyr Leu Pro Gln Pro Ile
 20 25 30
 Tyr Arg His Ile Ala Ser Phe Leu Ser Val Phe Lys Leu Val Leu Ile
 35 40 45
 Gly Leu Ile Ile Val Gly Lys Asp Pro Phe Ala Phe Phe Gly Met Gln
 50 55 60
 Ala Pro Ser Ile Trp Gln Trp Gly Gln Glu Asn Lys Val Tyr Ala Cys
 65 70 75 80
 Met Met Val Phe Phe Leu Ser Asn Met Ile Glu Asn Gln Cys Met Ser
 85 90 95
 Thr Gly Ala Phe Glu Ile Thr Leu Asn Asp Val Pro Val Trp Ser Lys
 100 105 110
 Leu Glu Ser Gly His Leu Pro Ser Met Gln Gln Leu Val Gln Ile Leu
 115 120 125
 Asp Asn Glu Met Lys Leu Asn Val His Met Asp Ser Ile Pro His His
 130 135 140
 Arg Ser
 145

<210> 285
 <211> 34
 <212> PRT
 <213> Homo sapiens

<400> 285
 Gly Tyr Arg Arg Val Phe Glu Glu Tyr Met Arg Val Ile Ser Gln Arg
 1 5 10 15
 Tyr Pro Asp Ile Arg Ile Glu Gly Glu Asn Tyr Leu Pro Gln Pro Ile
 20 25 30
 Tyr Arg

147

<210> 286
<211> 34
<212> PRT
<213> Homo sapiens

<400> 286
His Ile Ala Ser Phe Leu Ser Val Phe Lys Leu Val Leu Ile Gly Leu
1 5 10 15
Ile Ile Val Gly Lys Asp Pro Phe Ala Phe Phe Gly Met Gln Ala Pro
20 25 30
Ser Ile

<210> 287
<211> 34
<212> PRT
<213> Homo sapiens

<400> 287
Trp Gln Trp Gly Gln Glu Asn Lys Val Tyr Ala Cys Met Met Val Phe
1 5 10 15
Phe Leu Ser Asn Met Ile Glu Asn Gln Cys Met Ser Thr Gly Ala Phe
20 25 30
Glu Ile

<210> 288
<211> 36
<212> PRT
<213> Homo sapiens

<400> 288
Thr Leu Asn Asp Val Pro Val Trp Ser Lys Leu Glu Ser Gly His Leu
1 5 10 15
Pro Ser Met Gln Gln Leu Val Gln Ile Leu Asp Asn Glu Met Lys Leu
20 25 30
Asn Val His Met
35

<210> 289
<211> 8
<212> PRT
<213> Homo sapiens

<400> 289
Asp Ser Ile Pro His His Arg Ser
1 5

<210> 290
<211> 30
<212> PRT
<213> Homo sapiens

<400> 290

Gly Arg Ala Arg Gly Arg Pro Pro Gly Pro Glu Ala Ala Pro Ala Ser
 1 5 10 15

Leu Ser Val Ser Leu Arg Arg Glu Val His Ser Arg Gly Glu
 20 25 30

<210> 291

<211> 389

<212> PRT

<213> Homo sapiens

<400> 291

Met Ile Ser Leu Pro Gly Pro Leu Val Thr Asn Leu Leu Arg Phe Leu
 1 5 10 15

Phe Leu Gly Leu Ser Ala Leu Ala Pro Pro Ser Arg Ala Gln Leu Gln
 20 25 30

Leu His Leu Pro Ala Asn Arg Leu Gln Ala Val Glu Gly Gly Glu Val
 35 40 45

Val Leu Pro Ala Trp Tyr Thr Leu His Gly Glu Val Ser Ser Ser Gln
 50 55 60

Pro Trp Glu Val Pro Phe Val Met Trp Phe Phe Lys Gln Lys Glu Lys
 65 70 75 80

Glu Asp Gln Val Leu Ser Tyr Ile Asn Gly Val Thr Thr Ser Lys Pro
 85 90 95

Gly Val Ser Leu Val Tyr Ser Met Pro Ser Arg Asn Leu Ser Leu Arg
 100 105 110

Leu Glu Gly Leu Gln Glu Lys Asp Ser Gly Pro Tyr Ser Cys Ser Val
 115 120 125

Asn Val Gln Asn Lys Gln Gly Lys Ser Arg Gly His Ser Ile Lys Thr
 130 135 140

Leu Glu Leu Asn Val Leu Val Pro Pro Ala Pro Pro Ser Cys Arg Leu
 145 150 155 160

Gln Gly Val Pro His Val Gly Ala Asn Val Thr Leu Ser Cys Gln Ser
 165 170 175

Pro Arg Ser Lys Pro Ala Val Gln Tyr Gln Trp Asp Arg Gln Leu Pro
 180 185 190

Ser Phe Gln Thr Phe Phe Ala Pro Ala Leu Asp Val Ile Arg Gly Ser
 195 200 205

Leu Ser Leu Thr Asn Leu Ser Ser Ser Met Ala Gly Val Tyr Val Cys
 210 215 220

Lys Ala His Asn Glu Val Gly Thr Ala Gln Cys Asn Val Thr Leu Glu
 225 230 235 240

Val Ser Thr Gly Pro Gly Ala Ala Val Val Ala Gly Ala Val Val Gly
 245 250 255

Thr Leu Val Gly Leu Gly Leu Leu Ala Gly Leu Val Leu Leu Tyr His
 260 265 270

Arg Arg Gly Lys Ala Leu Glu Glu Pro Ala Asn Asp Ile Lys Glu Asp
 275 280 285
 Ala Ile Ala Pro Arg Thr Leu Pro Trp Pro Lys Ser Ser Asp Thr Ile
 290 295 300
 Ser Lys Asn Gly Thr Leu Ser Ser Val Thr Ser Ala Arg Ala Leu Arg
 305 310 315 320
 Pro Pro His Gly Pro Pro Arg Pro Gly Ala Leu Thr Pro Thr Pro Ser
 325 330 335
 Leu Ser Ser Gln Ala Leu Pro Ser Pro Arg Leu Pro Thr Thr Asp Gly
 340 345 350
 Ala His Pro Gln Pro Ile Ser Pro Ile Pro Gly Gly Val Ser Ser Ser
 355 360 365
 Gly Leu Ser Arg Met Gly Ala Val Pro Val Met Val Pro Ala Gln Ser
 370 375 380
 Gln Ala Gly Ser Leu
 385

<210> 292
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 292
 Met Ile Ser Leu Pro Gly Pro Leu Val Thr Asn Leu Leu Arg Phe Leu
 1 5 10 15
 Phe Leu Gly Leu Ser Ala Leu Ala Pro Pro Ser Arg Ala Gln Leu Gln
 20 25 30
 Leu His Leu
 35

<210> 293
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 293
 Pro Ala Asn Arg Leu Gln Ala Val Glu Gly Gly Glu Val Val Leu Pro
 1 5 10 15
 Ala Trp Tyr Thr Leu His Gly Glu Val Ser Ser Ser Gln Pro Trp Glu
 20 25 30
 Val Pro Phe
 35

<210> 294
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 294

150

Val Met Trp Phe Phe Lys Gln Lys Glu Lys Glu Asp Gln Val Leu Ser
 1 5 10 15
 Tyr Ile Asn Gly Val Thr Thr Ser Lys Pro Gly Val Ser Leu Val Tyr
 20 25 30
 Ser Met Pro
 35

<210> 295
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 295
 Ser Arg Asn Leu Ser Leu Arg Leu Glu Gly Leu Gln Glu Lys Asp Ser
 1 5 10 15
 Gly Pro Tyr Ser Cys Ser Val Asn Val Gln Asn Lys Gln Gly Lys Ser
 20 25 30
 Arg Gly His
 35

<210> 296
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 296
 Ser Ile Lys Thr Leu Glu Leu Asn Val Leu Val Pro Pro Ala Pro Pro
 1 5 10 15
 Ser Cys Arg Leu Gln Gly Val Pro His Val Gly Ala Asn Val Thr Leu
 20 25 30
 Ser Cys Gln
 35

<210> 297
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 297
 Ser Pro Arg Ser Lys Pro Ala Val Gln Tyr Gln Trp Asp Arg Gln Leu
 1 5 10 15
 Pro Ser Phe Gln Thr Phe Phe Ala Pro Ala Leu Asp Val Ile Arg Gly
 20 25 30
 Ser Leu Ser
 35

<210> 298
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 298

151

Leu Thr Asn Leu Ser Ser Ser Met Ala Gly Val Tyr Val Cys Lys Ala
 1 5 10 15

His Asn Glu Val Gly Thr Ala Gln Cys Asn Val Thr Leu Glu Val Ser
 20 25 30

Thr Gly Pro
 35

<210> 299

<211> 35

<212> PRT

<213> Homo sapiens

<400> 299

Gly Ala Ala Val Val Ala Gly Ala Val Val Gly Thr Leu Val Gly Leu
 1 5 10 15

Gly Leu Leu Ala Gly Leu Val Leu Leu Tyr His Arg Arg Gly Lys Ala
 20 25 30

Leu Glu Glu
 35

<210> 300

<211> 35

<212> PRT

<213> Homo sapiens

<400> 300

Pro Ala Asn Asp Ile Lys Glu Asp Ala Ile Ala Pro Arg Thr Leu Pro
 1 5 10 15

Trp Pro Lys Ser Ser Asp Thr Ile Ser Lys Asn Gly Thr Leu Ser Ser
 20 25 30

Val Thr Ser
 35

<210> 301

<211> 35

<212> PRT

<213> Homo sapiens

<400> 301

Ala Arg Ala Leu Arg Pro Pro His Gly Pro Pro Arg Pro Gly Ala Leu
 1 5 10 15

Thr Pro Thr Pro Ser Leu Ser Ser Gln Ala Leu Pro Ser Pro Arg Leu
 20 25 30

Pro Thr Thr
 35

<210> 302

<211> 39

<212> PRT

<213> Homo sapiens

<400> 302

152

Asp Gly Ala His Pro Gln Pro Ile Ser Pro Ile Pro Gly Gly Val Ser
1 5 10 15
Ser Ser Gly Leu Ser Arg Met Gly Ala Val Pro Val Met Val Pro Ala
20 25 30
Gln Ser Gln Ala Gly Ser Leu
35

<210> 303
<211> 27
<212> PRT
<213> Homo sapiens

<400> 303
Gly Ser Ser Phe Val Val Ser Glu Gly Ser Tyr Leu Asp Ile Ser Asp
1 5 10 15
Trp Leu Asn Pro Ala Lys Leu Ser Leu Tyr Tyr
20 25

<210> 304
<211> 12
<212> PRT
<213> Homo sapiens

<400> 304
Leu Asp Ile Ser Asp Trp Leu Asn Pro Ala Lys Leu
1 5 10

<210> 305
<211> 11
<212> PRT
<213> Homo sapiens

<400> 305
Ser Asp Trp Leu Asn Pro Ala Lys Leu Ser Leu
1 5 10

<210> 306
<211> 11
<212> PRT
<213> Homo sapiens

<400> 306
Ser Asp Trp Leu Asn Pro Ala Lys Leu Ser Leu
1 5 10

<210> 307
<211> 27
<212> PRT
<213> Homo sapiens

<400> 307
Gly Ser Ser Phe Val Val Ser Glu Gly Ser Tyr Leu Asp Ile Ser Asp
1 5 10 15
Trp Leu Asn Pro Ala Lys Leu Ser Leu Tyr Tyr
20 25

<210> 308
<211> 12
<212> PRT
<213> Homo sapiens

<400> 308
Leu Asp Ile Ser Asp Trp Leu Asn Pro Ala Lys Leu
1 5 10

<210> 309
<211> 11
<212> PRT
<213> Homo sapiens

<400> 309
Ser Asp Trp Leu Asn Pro Ala Lys Leu Ser Leu
1 5 10

<210> 310
<211> 13
<212> PRT
<213> Homo sapiens

<400> 310
Asp Ala Cys Glu Gln Leu Cys Asp Pro Glu Thr Gly Glu
1 5 10

<210> 311
<211> 21
<212> PRT
<213> Homo sapiens

<400> 311
Glu Gly Lys Ile Lys Ile Cys Glu Lys Lys Ala Ile Lys Val Ile Leu
1 5 10 15

His Thr Cys Asn Ser
20

<210> 312
<211> 23
<212> PRT
<213> Homo sapiens

<400> 312
Asn Ser Ala Arg Val Glu Phe Phe Ile Pro Pro Leu Arg Ile Thr Gln
1 5 10 15

Lys Val Arg Ser Thr Lys Ser
20

<210> 313
<211> 123
<212> PRT
<213> Homo sapiens

<400> 313

154

Met Met Val Trp Asn Leu Phe Pro Cys Phe Pro Pro Leu Leu Leu Leu
 1 5 10 15
 Gln Phe Ile Asp Cys Gln Gln Ser Ser Glu Ile Glu Gln Gly Phe Thr
 20 25 30
 Arg Ser Leu Leu Gly His Pro Ile Phe Phe Cys Pro Asp Pro Cys Trp
 35 40 45
 Gln Ser Cys Met Asn Cys Val Ile Leu Ser Val Leu Ser Phe Phe Phe
 50 55 60
 Leu Ile Arg Trp Ile Ser Lys Ile Val Ala Val Gln Lys Leu Glu Ser
 65 70 75 80
 Ser Ser Arg Arg Lys Pro Ile Leu Phe Leu Ile Ile Ser Cys Glu Ile
 85 90 95
 Ala Ser Phe Ile His Leu Phe Leu Ser Gln Met Ser Ala Glu Cys Cys
 100 105 110
 Cys Phe Tyr Leu Val Ile Leu Ile Cys Lys Tyr
 115 120

<210> 314
 <211> 28
 <212> PRT
 <213> Homo sapiens

<400> 314
 Met Met Val Trp Asn Leu Phe Pro Cys Phe Pro Pro Leu Leu Leu Leu
 1 5 10 15
 Gln Phe Ile Asp Cys Gln Gln Ser Ser Glu Ile Glu
 20 25

<210> 315
 <211> 28
 <212> PRT
 <213> Homo sapiens

<400> 315
 Gln Gly Phe Thr Arg Ser Leu Leu Gly His Pro Ile Phe Phe Cys Pro
 1 5 10 15
 Asp Pro Cys Trp Gln Ser Cys Met Asn Cys Val Ile
 20 25

<210> 316
 <211> 35
 <212> PRT
 <213> Homo sapiens

<400> 316
 Leu Ser Val Leu Ser Phe Phe Phe Leu Ile Arg Trp Ile Ser Lys Ile
 1 5 10 15
 Val Ala Val Gln Lys Leu Glu Ser Ser Ser Arg Arg Lys Pro Ile Leu
 20 25 30
 Phe Leu Ile

35

<210> 317
<211> 32
<212> PRT
<213> Homo sapiens

<400> 317
Ile Ser Cys Glu Ile Ala Ser Phe Ile His Leu Phe Leu Ser Gln Met
1 5 10 15
Ser Ala Glu Cys Cys Cys Phe Tyr Leu Val Ile Leu Ile Cys Lys Tyr
20 25 30

<210> 318
<211> 59
<212> PRT
<213> Homo sapiens

<400> 318
Lys Val Asp Thr Pro Arg Arg His Phe Cys Pro Glu Ile Ser Phe Phe
1 5 10 15
Leu Thr Pro Leu Pro Gln Ser Ala Arg Asn Ser Thr Val Arg Asn Ala
20 25 30
Leu Ser Gly Leu Lys Asn Leu Thr Pro Ala Met Ile Ser Thr Val Ser
35 40 45
Lys Gln Asp Thr Ser Lys Leu Gly Glu Glu Glu
50 55

<210> 319
<211> 13
<212> PRT
<213> Homo sapiens

<400> 319
Leu Leu Leu Cys Pro Trp Trp Leu Cys Phe Asp Trp Ser
1 5 10

<210> 320
<211> 270
<212> PRT
<213> Homo sapiens

<400> 320
Met Gly Cys Ile Pro Leu Ile Lys Ser Ile Ser Asp Trp Arg Val Ile
1 5 10 15
Ala Leu Ala Ala Leu Trp Phe Cys Leu Ile Gly Leu Ile Cys Gln Ala
20 25 30
Leu Cys Ser Glu Asp Gly His Lys Arg Arg Ile Leu Thr Leu Gly Leu
35 40 45
Gly Phe Leu Val Ile Pro Phe Leu Pro Ala Ser Asn Leu Phe Phe Arg

156

50	55	60
Val Gly Phe Val Val Ala Glu Cys Val Leu Tyr Leu Pro Ser Ile Gly		
65	70	75 80
Tyr Cys Val Leu Leu Thr Phe Gly Phe Gly Ala Leu Ser Lys His Thr		
	85	90 95
Lys Lys Lys Lys Leu Ile Ala Ala Val Val Leu Gly Ile Leu Phe Ile		
	100	105 110
Asn Thr Leu Arg Cys Val Leu Arg Thr Ala Lys Trp Arg Ser Glu Glu		
	115	120 125
Gln Leu Phe Arg Ser Ala Leu Ser Val Cys Pro Leu Asn Ala Lys Val		
	130	135 140
His Tyr Asn Ile Gly Lys Asn Leu Ala Asp Lys Gly Asn Gln Thr Ala		
	145	150 155 160
Ala Ile Arg Tyr Tyr Arg Glu Ala Val Arg Leu Asn Pro Lys Tyr Val		
	165	170 175
His Ala Met Asn Asn Leu Gly Asn Ile Leu Lys Glu Arg Asn Glu Leu		
	180	185 190
Gln Glu Ala Glu Glu Leu Leu Ser Leu Ala Val Gln Ile Gln Pro Asp		
	195	200 205
Phe Ala Ala Ala Trp Met Asn Leu Gly Ile Val Gln Asn Ser Leu Lys		
	210	215 220
Arg Phe Glu Thr Ala Glu Gln Asn Tyr Arg Thr Ala Ile Lys His Arg		
	225	230 235 240
Arg Lys Tyr Pro Asp Cys Tyr Tyr Asn Leu Gly Arg Leu Val Arg Thr		
	245	250 255
Gly Cys Pro Val Pro Val Glu Gly Lys Met Gly Tyr Phe Ser		
	260	265 270

<210> 321

<211> 38

<212> PRT

<213> Homo sapiens

<400> 321

Met Gly Cys Ile Pro Leu Ile Lys Ser Ile Ser Asp Trp Arg Val Ile
1 5 10 15

Ala Leu Ala Ala Leu Trp Phe Cys Leu Ile Gly Leu Ile Cys Gln Ala
20 25 30

Leu Cys Ser Glu Asp Gly
35

<210> 322

<211> 38

<212> PRT

<213> Homo sapiens

<400> 322

157

His Lys Arg Arg Ile Leu Thr Leu Gly Leu Gly Phe Leu Val Ile Pro
1 5 10 15
Phe Leu Pro Ala Ser Asn Leu Phe Phe Arg Val Gly Phe Val Val Ala
20 25 30
Glu Cys Val Leu Tyr Leu
35

<210> 323
<211> 38
<212> PRT
<213> Homo sapiens

<400> 323
Pro Ser Ile Gly Tyr Cys Val Leu Leu Thr Phe Gly Phe Gly Ala Leu
1 5 10 15
Ser Lys His Thr Lys Lys Lys Lys Leu Ile Ala Ala Val Val Leu Gly
20 25 30
Ile Leu Phe Ile Asn Thr
35

<210> 324
<211> 38
<212> PRT
<213> Homo sapiens

<400> 324
Pro Ser Ile Gly Tyr Cys Val Leu Leu Thr Phe Gly Phe Gly Ala Leu
1 5 10 15
Ser Lys His Thr Lys Lys Lys Lys Leu Ile Ala Ala Val Val Leu Gly
20 25 30
Ile Leu Phe Ile Asn Thr
35

<210> 325
<211> 38
<212> PRT
<213> Homo sapiens

<400> 325
Leu Arg Cys Val Leu Arg Thr Ala Lys Trp Arg Ser Glu Glu Gln Leu
1 5 10 15
Phe Arg Ser Ala Leu Ser Val Cys Pro Leu Asn Ala Lys Val His Tyr
20 25 30
Asn Ile Gly Lys Asn Leu
35

<210> 326
<211> 38
<212> PRT
<213> Homo sapiens

<400> 326

158

Ala Asp Lys Gly Asn Gln Thr Ala Ala Ile Arg Tyr Tyr Arg Glu Ala
 1 5 10 15

Val Arg Leu Asn Pro Lys Tyr Val His Ala Met Asn Asn Leu Gly Asn
 20 25 30

Ile Leu Lys Glu Arg Asn
 35

<210> 327

<211> 38

<212> PRT

<213> Homo sapiens

<400> 327

Glu Leu Gln Glu Ala Glu Glu Leu Leu Ser Leu Ala Val Gln Ile Gln
 1 5 10 15

Pro Asp Phe Ala Ala Ala Trp Met Asn Leu Gly Ile Val Gln Asn Ser
 20 25 30

Leu Lys Arg Phe Glu Thr
 35

<210> 328

<211> 42

<212> PRT

<213> Homo sapiens

<400> 328

Ala Glu Gln Asn Tyr Arg Thr Ala Ile Lys His Arg Arg Lys Tyr Pro
 1 5 10 15

Asp Cys Tyr Tyr Asn Leu Gly Arg Leu Val Arg Thr Gly Cys Pro Val
 20 25 30

Pro Val Glu Gly Lys Met Gly Tyr Phe Ser
 35 40

<210> 329

<211> 26

<212> PRT

<213> Homo sapiens

<400> 329

Pro Thr Arg Pro Pro Thr Arg Pro Leu Ser Phe Thr Phe Thr Lys Gln
 1 5 10 15

Thr Ser Ser Thr Cys Leu Ser Leu His Phe
 20 25

<210> 330

<211> 50

<212> PRT

<213> Homo sapiens

<400> 330

Leu Glu Cys Val Leu Leu Ile Cys Phe Arg Ala Met Ser Ala Ile Tyr
 1 5 10 15

159

Thr His Thr Ser Ile Gly Asn Ala Gln Lys Leu Phe Thr Asp Gly Ser
 20 25 30
 Ala Phe Arg Arg Val Arg Glu Pro Leu Pro Lys Glu Gly Lys Ser Trp
 35 40 45
 Pro Gln
 50

<210> 331
 <211> 22
 <212> PRT
 <213> Homo sapiens

<400> 331
 Lys Gln Asn Leu Thr Asn Leu Asp Val Pro Val Gln Tyr His Val Ala
 1 5 10 15
 Leu Ser Asp Lys Val Lys
 20

<210> 332
 <211> 117
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (71)
 <223> Xaa equals any of the naturally occurring L-amino acids

<400> 332
 Pro Ser Cys Pro Pro Glu Met Lys Lys Glu Leu Pro Val Asp Ser Cys
 1 5 10 15
 Leu Pro Arg Ser Leu Glu Leu His Pro Gln Lys Met Asp Pro Lys Arg
 20 25 30
 Gln His Ile Gln Leu Leu Ser Ser Leu Thr Glu Cys Leu Thr Val Asp
 35 40 45
 Pro Leu Ser Ala Ser Val Trp Arg Gln Leu Tyr Pro Lys His Leu Ser
 50 55 60
 Gln Ser Ser Leu Leu Leu Xaa His Leu Leu Ser Ser Trp Glu Gln Ile
 65 70 75 80
 Pro Lys Lys Val Gln Lys Ser Leu Gln Glu Thr Ile Gln Ser Leu Lys
 85 90 95
 Leu Thr Asn Gln Glu Leu Leu Arg Lys Gly Ser Ser Asn Asn Gln Asp
 100 105 110
 Val Val Thr Cys Asp
 115

<210> 333
 <211> 103
 <212> PRT
 <213> Homo sapiens

160

<400> 333

Lys Ala Pro Tyr Ser Trp Leu Ala Asp Ser Trp Pro His Pro Ser Arg
 1 5 10 15
 Ser Pro Ser Ala Gln Glu Pro Arg Gly Ser Cys Cys Pro Ser Asn Pro
 20 25 30
 Asp Pro Asp Asp Arg Tyr Tyr Asn Glu Ala Gly Ile Ser Leu Tyr Leu
 35 40 45
 Ala Gln Thr Ala Arg Gly Thr Ala Ala Pro Gly Glu Gly Pro Val Tyr
 50 55 60
 Ser Thr Ile Asp Pro Ala Gly Glu Glu Leu Gln Thr Phe His Gly Gly
 65 70 75 80
 Phe Pro Gln His Pro Ser Gly Asp Leu Gly Pro Trp Ser Gln Tyr Ala
 85 90 95
 Pro Pro Glu Trp Ser Gln Gly
 100

<210> 334

<211> 43

<212> PRT

<213> Homo sapiens

<400> 334

Leu Gln Gln Thr Met Gln Ala Met Leu His Phe Gly Gly Arg Leu Ala
 1 5 10 15
 Gln Ser Leu Arg Gly Thr Ser Lys Glu Ala Ala Ser Asp Pro Ser Asp
 20 25 30
 Ser Pro Asn Leu Pro Thr Pro Gly Ser Trp Trp
 35 40

<210> 335

<211> 45

<212> PRT

<213> Homo sapiens

<400> 335

Glu Gln Leu Thr Gln Ala Ser Arg Val Tyr Ala Ser Gly Gly Thr Glu
 1 5 10 15
 Gly Phe Pro Leu Ser Arg Trp Ala Pro Gly Arg His Gly Thr Ala Ala
 20 25 30
 Glu Glu Gly Ala Gln Glu Arg Pro Leu Pro Thr Asp Glu
 35 40 45

<210> 336

<211> 45

<212> PRT

<213> Homo sapiens

<400> 336

Met Ala Pro Gly Arg Gly Leu Trp Leu Gly Arg Leu Phe Gly Val Pro
 1 5 10 15

161

Gly Gly Pro Ala Glu Asn Glu Asn Gly Ala Leu Lys Ser Arg Arg Pro
 20 25 30

Ser Ser Trp Leu Pro Pro Thr Val Ser Val Leu Ala Leu
 35 40 45

<210> 337
 <211> 44
 <212> PRT
 <213> Homo sapiens

<400> 337
 Val Lys Arg Gly Ala Pro Pro Glu Met Pro Ser Pro Gln Glu Leu Glu
 1 5 10 15

Ala Ser Ala Pro Arg Met Val Gln Thr His Arg Ala Val Arg Ala Leu
 20 25 30

Cys Asp His Thr Ala Ala Arg Pro Asp Gln Leu Ser
 35 40

<210> 338
 <211> 38
 <212> PRT
 <213> Homo sapiens

<400> 338
 Phe Arg Arg Gly Glu Val Leu Arg Val Ile Thr Thr Val Asp Glu Asp
 1 5 10 15

Trp Leu Arg Cys Gly Arg Asp Gly Met Glu Gly Leu Val Pro Val Gly
 20 25 30

Tyr Thr Ser Leu Val Leu
 35

<210> 339
 <211> 215
 <212> PRT
 <213> Homo sapiens

<400> 339
 Leu Gln Gln Thr Met Gln Ala Met Leu His Phe Gly Gly Arg Leu Ala
 1 5 10 15

Gln Ser Leu Arg Gly Thr Ser Lys Glu Ala Ala Ser Asp Pro Ser Asp
 20 25 30

Ser Pro Asn Leu Pro Thr Pro Gly Ser Trp Trp Glu Gln Leu Thr Gln
 35 40 45

Ala Ser Arg Val Tyr Ala Ser Gly Gly Thr Glu Gly Phe Pro Leu Ser
 50 55 60

Arg Trp Ala Pro Gly Arg His Gly Thr Ala Ala Glu Glu Gly Ala Gln
 65 70 75 80

Glu Arg Pro Leu Pro Thr Asp Glu Met Ala Pro Gly Arg Gly Leu Trp
 85 90 95

Leu Gly Arg Leu Phe Gly Val Pro Gly Gly Pro Ala Glu Asn Glu Asn

162

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          100              105              110
Gly Ala Leu Lys Ser Arg Arg Pro Ser Ser Trp Leu Pro Pro Thr Val
  115              120              125
Ser Val Leu Ala Leu Val Lys Arg Gly Ala Pro Pro Glu Met Pro Ser
  130              135              140
Pro Gln Glu Leu Glu Ala Ser Ala Pro Arg Met Val Gln Thr His Arg
  145              150              155              160
Ala Val Arg Ala Leu Cys Asp His Thr Ala Ala Arg Pro Asp Gln Leu
  165              170              175
Ser Phe Arg Arg Gly Glu Val Leu Arg Val Ile Thr Thr Val Asp Glu
  180              185              190
Asp Trp Leu Arg Cys Gly Arg Asp Gly Met Glu Gly Leu Val Pro Val
  195              200              205
Gly Tyr Thr Ser Leu Val Leu
  210              215

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<210> 340

<211> 72

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (7)

<223> Xaa equals any of the naturally occurring L-amino acids

<400> 340

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Ala Arg Ala Cys Pro Arg Xaa Gly Ala Ala Val Glu Lys Leu Gly Gly
  1              5              10              15
Lys Pro Val Gln Pro Asp Ser Lys Pro Thr Cys Cys Ser Gln Val Lys
  20              25              30
Ala Glu Gly Leu Ile Phe Ala Gly Leu Thr Gly Leu Lys Leu Leu Pro
  35              40              45
Ser Ser Leu Gln Arg Ala Val Phe Val Arg Gln Cys Leu Gly Phe Trp
  50              55              60
Asn Asp Gly Ser Arg Ala Leu Gln
  65              70

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<210> 341

<211> 31

<212> PRT

<213> Homo sapiens

<400> 341

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Phe Gln Ser Val Tyr His Met Lys Leu Gln Ser Ser Asn Leu Pro Ala
  1              5              10              15
Ser Val Tyr Gly Asn Asn Leu Asn Cys Ile Asn Ser Ser Ser Ser
  20              25              30

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163

<210> 342
<211> 37
<212> PRT
<213> Homo sapiens

<400> 342
Phe Asp Phe Ile Ala Ser Leu Leu Lys Ala Asn Arg Leu Ser Leu Gln
1 5 10 15
Thr Cys Glu Leu Leu Ala Ala Leu Leu Pro Ser Glu Arg Tyr
20 25 30
Lys Ala Ile Ser Ile
35

<210> 343
<211> 25
<212> PRT
<213> Homo sapiens

<400> 343
Ile Asp Leu Ser Phe Pro Ser Thr Asn Val Ser Leu Glu Asp Arg Asn
1 5 10 15
Thr Thr Lys Pro Ser Val Asn Val Gly
20 25

<210> 344
<211> 15
<212> PRT
<213> Homo sapiens

<400> 344
Leu Asn Ile Leu Ile Ser Leu Thr Val Ser Ser His Cys Lys Leu
1 5 10 15

<210> 345
<211> 13
<212> PRT
<213> Homo sapiens

<400> 345
Ile Asn Tyr His Ser Gly Phe Ile His Gln Phe Leu Ala
1 5 10

<210> 346
<211> 11
<212> PRT
<213> Homo sapiens

<400> 346
Met Ala Asn Asn Ser Leu Ser Ser Gln Phe Ile
1 5 10

<210> 347
<211> 46
<212> PRT
<213> Homo sapiens

164

<400> 347
Pro Phe Trp Ala Ala Glu Ser Ala Leu Asp Phe His Trp Pro Phe Gly
1 5 10 15
Gly Ala Leu Cys Lys Met Val Leu Thr Ala Thr Val Leu Asn Val Tyr
20 25 30
Ala Ser Ile Phe Leu Ile Thr Ala Leu Ser Val Ala Arg Tyr
35 40 45

<210> 348
<211> 12
<212> PRT
<213> Homo sapiens

<400> 348
Thr His Ala Asp Lys Asn Gln Val Arg Asn Ser Asn
1 5 10

<210> 349
<211> 15
<212> PRT
<213> Homo sapiens

<400> 349
Gln Phe Leu Ser Trp Glu Gln Cys Thr Gly Asn Thr Glu Ser Gln
1 5 10 15

<210> 350
<211> 13
<212> PRT
<213> Homo sapiens

<220>
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<222> (9)
<223> Xaa equals any of the naturally occurring L-amino acids

<400> 350
Val Arg Arg Pro Lys Ala Lys Gly Xaa Gln Thr Ser Asn
1 5 10

<210> 351
<211> 19
<212> PRT
<213> Homo sapiens

<400> 351
Pro Thr Gln Leu Asn Lys His Lys Pro Thr Thr Lys Glu Arg Arg Arg
1 5 10 15

Lys Gly Leu

<210> 352
<211> 9
<212> PRT
<213> Homo sapiens

<400> 352

Leu Ile Ser Lys His Glu Asn Ile Tyr
1 5

<210> 353

<211> 27

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (5)

<223> Xaa equals any of the naturally occurring L-amino acids

<220>

<221> SITE

<222> (6)

<223> Xaa equals any of the naturally occurring L-amino acids

<220>

<221> SITE

<222> (8)

<223> Xaa equals any of the naturally occurring L-amino acids

<220>

<221> SITE

<222> (22)

<223> Xaa equals any of the naturally occurring L-amino acids

<400> 353

Thr Leu Tyr Ile Xaa Xaa Met Xaa Thr Gln Thr Trp Arg Asp Gln Gly
1 5 10 15Arg Cys Gly Arg Asp Xaa Ile Asn Cys Ile Val
20 25

<210> 354

<211> 33

<212> PRT

<213> Homo sapiens

<400> 354

Ser Leu Cys Thr Pro Gly Arg Gly Trp Glu Glu Ser Trp Gly Ser Ser
1 5 10 15Leu Pro Asn Leu Thr Gly Trp Ser Val Ser Ser Leu Asp Asn Asn Asp
20 25 30

Val

<210> 355

<211> 204

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (107)

<223> Xaa equals any of the naturally occurring L-amino acids

166

<400> 355

Met Gln Val Ala Leu Lys Glu Asp Leu Asp Ala Leu Lys Glu Lys Phe
 1 5 10 15

Arg Thr Met Glu Ser Asn Gln Lys Ser Ser Phe Gln Glu Ile Pro Lys
 20 25 30

Leu Asn Glu Glu Leu Leu Ser Lys Gln Lys Gln Leu Glu Lys Ile Glu
 35 40 45

Ser Gly Glu Met Gly Leu Asn Lys Val Trp Ile Asn Ile Thr Glu Met
 50 55 60

Asn Lys Gln Ile Ser Leu Leu Thr Ser Ala Val Asn His Leu Lys Ala
 65 70 75 80

Asn Val Lys Ser Ala Ala Asp Leu Ile Ser Leu Pro Thr Thr Val Glu
 85 90 95

Gly Leu Gln Lys Ser Val Ala Ser Ile Gly Xaa Thr Leu Asn Ser Val
 100 105 110

His Leu Ala Val Glu Ala Leu Gln Lys Thr Val Asp Glu His Lys Lys
 115 120 125

Thr Met Glu Leu Leu Gln Ser Asp Met Asn Gln His Phe Leu Lys Glu
 130 135 140

Thr Pro Gly Ser Asn Gln Ile Ile Pro Ser Pro Ser Ala Thr Ser Glu
 145 150 155 160

Leu Asp Asn Lys Thr His Ser Glu Asn Leu Lys Gln Met Gly Asp Arg
 165 170 175

Ser Ala Thr Leu Lys Arg Gln Ser Leu Asp Gln Val Thr Asn Arg Thr
 180 185 190

Asp Thr Val Lys Ile Gln Ser Ile Lys Lys Glu Gly
 195 200

<210> 356

<211> 43

<212> PRT

<213> Homo sapiens

<400> 356

Met Gln Val Ala Leu Lys Glu Asp Leu Asp Ala Leu Lys Glu Lys Phe
 1 5 10 15

Arg Thr Met Glu Ser Asn Gln Lys Ser Ser Phe Gln Glu Ile Pro Lys
 20 25 30

Leu Asn Glu Glu Leu Leu Ser Lys Gln Lys Gln
 35 40

<210> 357

<211> 43

<212> PRT

<213> Homo sapiens

<400> 357

Leu Glu Lys Ile Glu Ser Gly Glu Met Gly Leu Asn Lys Val Trp Ile

167

1 5 10 15
 Asn Ile Thr Glu Met Asn Lys Gln Ile Ser Leu Leu Thr Ser Ala Val
 20 25 30
 Asn His Leu Lys Ala Asn Val Lys Ser Ala Ala
 35 40

<210> 358
 <211> 43
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (21)
 <223> Xaa equals any of the naturally occurring L-amino acids

<400> 358
 Asp Leu Ile Ser Leu Pro Thr Thr Val Glu Gly Leu Gln Lys Ser Val
 1 5 10 15
 Ala Ser Ile Gly Xaa Thr Leu Asn Ser Val His Leu Ala Val Glu Ala
 20 25 30
 Leu Gln Lys Thr Val Asp Glu His Lys Lys Thr
 35 40

<210> 359
 <211> 43
 <212> PRT
 <213> Homo sapiens

<400> 359
 Met Glu Leu Leu Gln Ser Asp Met Asn Gln His Phe Leu Lys Glu Thr
 1 5 10 15
 Pro Gly Ser Asn Gln Ile Ile Pro Ser Pro Ser Ala Thr Ser Glu Leu
 20 25 30
 Asp Asn Lys Thr His Ser Glu Asn Leu Lys Gln
 35 40

<210> 360
 <211> 32
 <212> PRT
 <213> Homo sapiens

<400> 360
 Met Gly Asp Arg Ser Ala Thr Leu Lys Arg Gln Ser Leu Asp Gln Val
 1 5 10 15
 Thr Asn Arg Thr Asp Thr Val Lys Ile Gln Ser Ile Lys Lys Glu Gly
 20 25 30

<210> 361
 <211> 12

168

<212> PRT

<213> Homo sapiens

<400> 361

Ser Pro Gln Phe Leu Ser Ser Lys Ser Leu Pro Thr
 1 5 10

<210> 362

<211> 107

<212> PRT

<213> Homo sapiens

<400> 362

Gly Pro Pro Ser Pro Arg Gly Leu Pro Ser Leu Pro Leu His Leu Pro
 1 5 10 15
 Ala Pro Arg Arg Tyr Leu Gln Ser Arg Tyr Ala Cys Ser Gln Ser Ser
 20 25 30
 Val Ser Ala Ala Ala Arg Arg Trp Gly Ser Gly Trp Met Ala Trp Asp
 35 40 45
 Pro Trp Asn Gln Ala Ser Gly Arg Tyr Ala Arg Ile Thr Leu Leu Ser
 50 55 60
 Val Gln Ala Cys His Gln Pro Thr Val Trp Pro Arg Ala Gly His Ser
 65 70 75 80
 Leu Pro Glu Arg Tyr Ser Leu His Pro His Asn Gly Asp Ser Thr His
 85 90 95
 Leu Ser Gly Leu Leu Thr Val Lys Cys Gly Ala
 100 105

<210> 363

<211> 37

<212> PRT

<213> Homo sapiens

<400> 363

Gly Pro Pro Ser Pro Arg Gly Leu Pro Ser Leu Pro Leu His Leu Pro
 1 5 10 15
 Ala Pro Arg Arg Tyr Leu Gln Ser Arg Tyr Ala Cys Ser Gln Ser Ser
 20 25 30
 Val Ser Ala Ala Ala
 35

<210> 364

<211> 33

<212> PRT

<213> Homo sapiens

<400> 364

Arg Arg Trp Gly Ser Gly Trp Met Ala Trp Asp Pro Trp Asn Gln Ala
 1 5 10 15
 Ser Gly Arg Tyr Ala Arg Ile Thr Leu Leu Ser Val Gln Ala Cys His
 20 25 30

Gln

<210> 365
<211> 37
<212> PRT
<213> Homo sapiens

<400> 365
Pro Thr Val Trp Pro Arg Ala Gly His Ser Leu Pro Glu Arg Tyr Ser
1 5 10 15
Leu His Pro His Asn Gly Asp Ser Thr His Leu Ser Gly Leu Leu Thr
20 25 30
Val Lys Cys Gly Ala
35

<210> 366
<211> 18
<212> PRT
<213> Homo sapiens

<400> 366
Asn Gln Glu Asn Ser Leu Gln Thr Asn Ser Tyr Leu Asp Ser Thr Glu
1 5 10 15
Ser Lys

<210> 367
<211> 31
<212> PRT
<213> Homo sapiens

<220>
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<222> (17)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
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<222> (19)
<223> Xaa equals any of the naturally occurring L-amino acids

<220>
<221> SITE
<222> (30)
<223> Xaa equals any of the naturally occurring L-amino acids

<400> 367
Gln Lys Arg Ala Cys Phe Pro Phe Ala Phe Cys Arg Asp Cys Gln Phe
1 5 10 15
Xaa Glu Xaa Ser Pro Ala Met Leu Pro Val Gln Pro Ala Xaa Leu
20 25 30

<210> 368
<211> 11
<212> PRT

170

<213> Homo sapiens

<400> 368

Val Ser Ala His Gly Ile Trp Leu Phe Arg Ser
1 5 10

<210> 369

<211> 49

<212> PRT

<213> Homo sapiens

<220>

<221> SITE

<222> (35)

<223> Xaa equals any of the naturally occurring L-amino acids

<220>

<221> SITE

<222> (37)

<223> Xaa equals any of the naturally occurring L-amino acids

<220>

<221> SITE

<222> (48)

<223> Xaa equals any of the naturally occurring L-amino acids

<400> 369

Lys His Ala Ala Pro Pro Ala Ser Leu Ser Leu Ser Leu Leu His
1 5 10 15

His Gly Gln Lys Arg Ala Cys Phe Pro Phe Ala Phe Cys Arg Asp Cys
20 25 30

Gln Phe Xaa Glu Xaa Ser Pro Ala Met Leu Pro Val Gln Pro Ala Xaa
35 40 45

Leu

<210> 370

<211> 12

<212> PRT

<213> Homo sapiens

<400> 370

Ile Pro Glu Glu Ala Ser Cys Phe Pro Ser Ala Val
1 5 10

<210> 371

<211> 17

<212> PRT

<213> Homo sapiens

<400> 371

Glu Ile Leu Phe Gly Lys Leu Lys Ser Lys Ala Ala Leu Cys Thr Gln
1 5 10 15

Gly

171

<210> 372
<211> 19
<212> PRT
<213> Homo sapiens

<400> 372
His Ala Asp Arg Tyr Thr Cys Cys Arg Cys Leu Ser Pro Phe Ser Leu
1 5 10 15

Ala Gly Leu

<210> 373
<211> 15
<212> PRT
<213> Homo sapiens

<400> 373
Leu Ser Asp Pro Leu Leu Leu Pro Asp Cys Ser Phe Ser Phe Asn
1 5 10 15

<210> 374
<211> 25
<212> PRT
<213> Homo sapiens

<400> 374
Lys Ala Val Ala Tyr Ala Asn Val Ser Cys Arg Arg Phe Lys His Lys
1 5 10 15

Thr Thr Lys Leu Gly Pro Ile Gln Trp
20 25

<210> 375
<211> 26
<212> PRT
<213> Homo sapiens

<400> 375
Pro Ser Ser Gln Ser Pro Glu Pro Pro Gln Pro Leu Ser Leu Phe Val
1 5 10 15

Thr Arg Leu Pro Asn Leu Tyr Asp Phe Pro
20 25

<210> 376
<211> 19
<212> PRT
<213> Homo sapiens

<400> 376
Ser Arg Gln Ile Ile Cys Thr Asn Leu Cys Lys Cys Thr Pro Ile Cys
1 5 10 15

Phe Leu Phe

<210> 377
<211> 11

<212> PRT
<213> Homo sapiens

<400> 377
Met Leu Leu Pro Val Asn Thr Leu Leu Tyr Ile
1 5 10

<210> 378
<211> 14
<212> PRT
<213> Homo sapiens

<400> 378
Leu Leu Thr Pro Leu Cys Phe Phe Tyr Gly Thr Ser Arg Pro
1 5 10

<210> 379
<211> 7
<212> PRT
<213> Homo sapiens

<400> 379
Pro Tyr Leu Glu Leu Val Thr
1 5

<210> 380
<211> 13
<212> PRT
<213> Homo sapiens

<400> 380
Leu Leu Lys Lys Lys Lys Gln Ser Val Gly Phe Ser Val
1 5 10

<210> 381
<211> 7
<212> PRT
<213> Homo sapiens

<400> 381
Cys Ile Leu Glu Ala Gly Arg
1 5

<210> 382
<211> 11
<212> PRT
<213> Homo sapiens

<400> 382
Met Gly Phe Ser Ala Pro Thr Pro Gly Pro Leu
1 5 10

<210> 383
<211> 11
<212> PRT
<213> Homo sapiens

<400> 383

173

Phe Asp Leu Arg Arg Leu Ile Leu Ser Ile Val
1 5 10

<210> 384
<211> 17
<212> PRT
<213> Homo sapiens

<400> 384
Ala Phe Cys Pro His Val Thr Pro Cys Lys Tyr Ala Val Ile His Thr
1 5 10 15

Val

<210> 385
<211> 11
<212> PRT
<213> Homo sapiens

<400> 385
Asn Thr Pro Leu Leu Phe Leu Trp Asp Leu Gln
1 5 10

<210> 386
<211> 17
<212> PRT
<213> Homo sapiens

<400> 386
Ala Thr Ile Phe Arg Thr Ser Tyr Leu Ile Lys Lys Glu Lys Thr Val
1 5 10 15

Cys

<210> 387
<211> 17
<212> PRT
<213> Homo sapiens

<400> 387
Trp Leu Leu Ser Leu His Leu Gly Gly Arg Glu Val Arg Ala Gly Ala
1 5 10 15

Pro

<210> 388
<211> 11
<212> PRT
<213> Homo sapiens

<400> 388
Gln Thr Leu Gln Glu Gly Ser Leu His Ser Ile
1 5 10

<210> 389

<211> 95
 <212> PRT
 <213> Homo sapiens

<400> 389
 Met Gly Phe Ser Ala Pro Thr Pro Gly Pro Leu Phe Asp Leu Arg Arg
 1 5 10 15
 Leu Ile Leu Ser Ile Val Ala Phe Cys Pro His Val Thr Pro Cys Lys
 20 25 30
 Tyr Ala Val Ile His Thr Val Asn Thr Pro Leu Leu Phe Leu Trp Asp
 35 40 45
 Leu Gln Ala Thr Ile Phe Arg Thr Ser Tyr Leu Ile Lys Lys Glu Lys
 50 55 60
 Thr Val Cys Trp Leu Leu Ser Leu His Leu Gly Gly Arg Glu Val Arg
 65 70 75 80
 Ala Gly Ala Pro Gln Thr Leu Gln Glu Gly Ser Leu His Ser Ile
 85 90 95

<210> 390
 <211> 33
 <212> PRT
 <213> Homo sapiens

<400> 390
 Tyr Trp Val Ser Ile Ser Gln Arg Ser Val Cys Gln Gln Ala Arg Thr
 1 5 10 15
 Ser Ile Phe Phe Lys Asp Gly Leu Ser Arg Glu Lys Tyr Ser Asn Asn
 20 25 30
 Gly

<210> 391
 <211> 160
 <212> PRT
 <213> Homo sapiens

<400> 391
 Leu Ser Val Arg Ala Pro Gly Val Pro Ala Ala Arg Pro Arg Leu Ser
 1 5 10 15
 Ser Ala Arg Gln Ala Gly Ala Gly Arg Gly Glu Leu Arg Gly Gln Arg
 20 25 30
 Leu Trp Leu Gly Pro Glu Cys Gly Cys Gly Ala Gly Gln Ala Gly Ser
 35 40 45
 Met Leu Arg Ala Val Gly Ser Leu Leu Arg Leu Gly Arg Gly Leu Thr
 50 55 60
 Val Arg Cys Gly Pro Gly Ala Pro Leu Glu Ala Thr Arg Arg Pro Ala
 65 70 75 80
 Pro Ala Leu Pro Pro Arg Gly Leu Pro Cys Tyr Ser Ser Gly Gly Ala
 85 90 95

175

Pro Ser Asn Ser Gly Pro Gln Gly His Gly Glu Ile His Arg Val Pro
 100 105 110
 Thr Gln Arg Arg Pro Ser Gln Phe Asp Lys Lys Ile Leu Leu Trp Thr
 115 120 125
 Gly Arg Phe Lys Ser Met Glu Glu Ile Pro Pro Arg Ile Pro Pro Glu
 130 135 140
 Met Ile Asp Thr Ala Arg Asn Lys Ala Arg Val Lys Ala Cys Tyr Ile
 145 150 155 160

<210> 392
 <211> 36
 <212> PRT
 <213> Homo sapiens

<400> 392
 Leu Ser Val Arg Ala Pro Gly Val Pro Ala Ala Arg Pro Arg Leu Ser
 1 5 10 15
 Ser Ala Arg Gln Ala Gly Ala Gly Arg Gly Glu Leu Arg Gly Gln Arg
 20 25 30
 Leu Trp Leu Gly
 35

<210> 393
 <211> 34
 <212> PRT
 <213> Homo sapiens

<400> 393
 Pro Glu Cys Gly Cys Gly Ala Gly Gln Ala Gly Ser Met Leu Arg Ala
 1 5 10 15
 Val Gly Ser Leu Leu Arg Leu Gly Arg Gly Leu Thr Val Arg Cys Gly
 20 25 30
 Pro Gly

<210> 394
 <211> 34
 <212> PRT
 <213> Homo sapiens

<400> 394
 Ala Pro Leu Glu Ala Thr Arg Arg Pro Ala Pro Ala Leu Pro Pro Arg
 1 5 10 15
 Gly Leu Pro Cys Tyr Ser Ser Gly Gly Ala Pro Ser Asn Ser Gly Pro
 20 25 30
 Gln Gly

176

<210> 395
<211> 27
<212> PRT
<213> Homo sapiens

<400> 395
His Gly Glu Ile His Arg Val Pro Thr Gln Arg Arg Pro Ser Gln Phe
1 5 10 15
Asp Lys Lys Ile Leu Leu Trp Thr Gly Arg Phe
20 25

<210> 396
<211> 29
<212> PRT
<213> Homo sapiens

<400> 396
Lys Ser Met Glu Glu Ile Pro Pro Arg Ile Pro Pro Glu Met Ile Asp
1 5 10 15
Thr Ala Arg Asn Lys Ala Arg Val Lys Ala Cys Tyr Ile
20 25

<210> 397
<211> 9
<212> PRT
<213> Homo sapiens

<400> 397
Glu Leu Ala Ile Gly Glu Ser Cys Ser
1 5

<210> 398
<211> 17
<212> PRT
<213> Homo sapiens

<400> 398
Pro Val Ile Trp Pro Asp Gly Lys Arg Ile Val Leu Leu Ala Glu Val
1 5 10 15
Ser

<210> 399
<211> 10
<212> PRT
<213> Homo sapiens

<400> 399
Cys Phe Leu Ser Val Ser Phe Gln Trp Asn
1 5 10

<210> 400
<211> 17
<212> PRT
<213> Homo sapiens

177

<400> 400
Val Thr Ile Ala Gln Val Gly Ile Phe Val Cys Phe Val His Cys Cys
1 5 10 15

Thr

<210> 401
<211> 17
<212> PRT
<213> Homo sapiens

<400> 401
Pro Gly Gln Val Pro Ser Lys His Leu Gly Ser Asn Ala Ser Val Arg
1 5 10 15

Ala

<210> 402
<211> 22
<212> PRT
<213> Homo sapiens

<400> 402
Asp Glu Gly Ala Lys Val Gln Arg Arg Pro Trp Gly Ser Gln Thr His
1 5 10 15

Ser Pro Val Leu Phe Leu
20

<210> 403
<211> 18
<212> PRT
<213> Homo sapiens

<400> 403
Leu Thr Arg Pro Gly Leu Trp Gly Ser Leu Leu Pro Val Gln Gln Gln
1 5 10 15

Arg Gly

<210> 404
<211> 15
<212> PRT
<213> Homo sapiens

<400> 404
Cys Ala Ser Leu Gly Val Leu Arg Ala Asn Arg Ser Pro Cys Val
1 5 10 15

<210> 405
<211> 18
<212> PRT
<213> Homo sapiens

<400> 405
Ser Trp Leu Glu Val Thr Thr Leu Ser Ala Pro Gly Pro Val Ile Thr

178

1 5 10 15

Thr Tyr

<210> 406
<211> 18
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (9)
<223> Xaa equals any of the naturally occurring L-amino acids

<400> 406
Pro Gly Gln Trp Val Arg Glu Ile Xaa Leu Val Gly Arg Ala Val Ala
1 5 10 15

Arg Val

<210> 407
<211> 16
<212> PRT
<213> Homo sapiens

<220>
<221> SITE
<222> (6)
<223> Xaa equals any of the naturally occurring L-amino acids

<400> 407
Leu Thr Trp Pro Pro Xaa Gly Pro Met Gly Thr Val Trp Pro Gly Phe
1 5 10 15

<210> 408
<211> 17
<212> PRT
<213> Homo sapiens

<400> 408
Met Ala Asp Ile Pro Gly Thr Phe Leu Ala Leu Gly Cys His Gly Gln
1 5 10 15

Arg

<210> 409
<211> 15
<212> PRT
<213> Homo sapiens

<400> 409
Val Gly Arg Gly Ser Trp Ala Ser Gly Trp Thr Asn Gln Ser Ala
1 5 10 15

<210> 410
 <211> 16
 <212> PRT
 <213> Homo sapiens

<400> 410
 Pro Asp His Pro Leu Pro Val Gly Leu Leu Glu Ala Trp Arg Val Glu
 1 5 10 15

<210> 411
 <211> 94
 <212> PRT
 <213> Homo sapiens

<220>
 <221> SITE
 <222> (84)
 <223> Xaa equals any of the naturally occurring L-amino acids

<400> 411
 Leu Ala Arg Ala Asp Pro Pro Gly Cys Arg Arg Arg Gly Trp Arg Pro
 1 5 10 15
 Ser Ser Ala Glu Leu Gln Leu Arg Leu Leu Thr Pro Thr Phe Glu Gly
 20 25 30
 Ile Asn Gly Leu Leu Leu Lys Gln His Leu Val Gln Asn Pro Val Arg
 35 40 45
 Leu Trp Gln Leu Leu Gly Gly Thr Phe Tyr Phe Asn Thr Ser Arg Leu
 50 55 60
 Lys Gln Lys Asn Lys Glu Lys Asp Lys Ser Lys Gly Lys Ala Pro Glu
 65 70 75 80
 Glu Asp Glu Xaa Glu Arg Arg Arg Arg Glu Arg Asp Asp Gln
 85 90

<210> 412
 <211> 12
 <212> PRT
 <213> Homo sapiens

<400> 412
 Phe Leu Arg Phe Trp Cys Thr Cys His Val Ser Ser
 1 5 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/09847

A. CLASSIFICATION OF SUBJECT MATTER IPC(6) :C12N 15/00, 15/12; C07K 14/00, 14/435 US CL :435/69.1, 320.1, 325; 536/23.5; 530/350 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : 435/69.1, 320.1, 325; 536/23.5; 530/350 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Genbank, Genbak-EST, Swissprot		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KUSTIKOVA et al. Cloning of the tag7 gene expressed in metastatic mouse tumors. Genetika. May 1996, Vol. 32, No. 5, pages 621-628, Figure 3.	1-2, 7-11, 14-16
X,P	KISELEV et al. Molecular cloning and characterization of the mouse tag7 gene encoding a novel cytokine. J. Biol. Chem. July 1998, Vol. 273, No. 9, pages 18633-18639, Figure 1.	1-2, 7-11, 14-16
X,P	KANG et al. A peptidoglycan recognition protein in innate immunity conserved from insects to humans. Proc. Natl. Acad. Sci. USA. August 1998, Vol. 95, pages 10078-10082, Figure 1.	1-2, 7-11, 14-16
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* *A* *E* *L* *O* *P*	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance earlier document published on or after the international filing date document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed	*T* *X* *Y* *A* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art document member of the same patent family
Date of the actual completion of the international search 16 AUGUST 1999		Date of mailing of the international search report 10 SEP 1999
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230		Authorized officer: <i>D. Lawrence</i> ELIANE LAZAR-WESLEY Telephone No. (703) 308-0196

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/09847

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Database on GENESEQ, Accession Number W23723, SELSTED ME., Murine granulocyte peptide A precursor (antimicrobial MGP-A), 18 February 1998.	1-2, 7-11, 14-16
X,P	Database on GENBANK, Accession Number AC002559, EVANS et al. Homo sapiens chromosome 10 PAC clone pDJ205g22. 13 November 1998.	1-2, 7-11, 14-16
X	Database on GENBANK, Accession Number AA594742, NCI-CGAP . no03g09s1 Homo sapiens cDNA clone.	1-2,7-11, 14-16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/09847

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-12, 14-16 and 21, as they apply to SEQ ID No:11 and SEQ ID No:111

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/09847

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claims 1-12, 14-16 and 21, drawn to a polynucleotide fragment of SEQ ID No:11, a polynucleotide encoding a polypeptide fragment of SEQ ID No:111, a vector, a method of making a host cell, a host cell, a polypeptide, a method of making a polypeptide, and a gene.

Group II, claim 13, drawn to an antibody.

Group III, claim 17, drawn to a method of treating or preventing a medical condition.

Group IV, claims 18-19, drawn to a method of diagnosis.

Group V, claim 20, drawn to a method of identifying a binding partner.

Group VI, claim 22, drawn to a method of identifying an activity in a biological assay.

Group VII, claim 23, drawn to a product.

The inventions listed as Groups I-VII do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: pursuant to 37 CFR 1.475(d), this Authority considers that the main invention in the instant application comprises the first recited product, which is the polynucleotide fragment of SEQ ID No:11, the polynucleotide encoding the polypeptide of SEQ ID No:111, and the first recited method of using that product, namely in the process of making a recombinant cell. Note that there is no method of making the polynucleotide. Also included in this group is the product made, namely the encoded polypeptide, and vector, host cell, method of making the polypeptide, and gene. Further, pursuant to 37 CFR 1.475 (b)-(d), the ISA/US considers that the materially and functionally dissimilar products of Group II and VII, and the additional methods of Groups III-VI do not correspond to the main invention. This Authority therefore considers that the several inventions do not share a special technical feature within the meaning of PCT Rule 13.2 and thus do not relate to a single general inventive concept within the meaning of PCT rule 13.1.